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# An Assessment of the American Plaice Stock in NAFO Subdivision 3Ps

by

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## Abstract

Sampling data from 1973-81 were reviewed and recalculation of catch numbers and weights from this period, together with values from the more recent period permitted an assessment using sequential population analysis to be performed on this stock for the first time in several years. Calibration of the analysis with commercial CPUE indicated the fully-recruited fishing mortality in 1986 to be 0.18, slightly below the $F_{0.1}$ level. Research vessel surveys in 1986 and 1987 indicate the biomass to be close to the average from 1980-87. Catch rates in the commercial fishery declined in 1986 from the very high levels observed in 1984 and 1985, but are still higher than the historical average. Catch projections, based on the sequential population analysis at $F_t$ = 0.18, indicate the $F_{0.1}$ catch in 1988 to be 5,100 tons.



## Résumé

Les données d'échantillonnage pour 1973 à 1981 ont été examinées et de nouveaux calculs des nombres et des poids des prises pour cette période, ainsi que les valeurs obtenues pour la période plus récente, ont permis d'effectuer pour la première fois depuis plusieurs années dans le cas de ce stock une évaluation au moyen de l'analyse séquentielle de population. L'étalonnage de cette analyse à l'aide des PUE commerciales indique pour 1986 une valeur de la mortalité par pêche de plein recrutement de 0,18, soit légèrement inférieure à la valeur du $F_{0,1}$. Les relevés effectués à bord de navires de recherche en 1986 et 1987 indiquent une biomasse voisine de la valeur moyenne pour la période de 1980 à 1987. Les taux de prises des pêches commerciales ont diminué en 1986 par rapport aux niveaux très élevés en 1984 et en 1985, mais sont encore plus élevés que le taux moyen historique. Les projections concernant les prises basées sur l'analyse séquentielle de population et un $F_T$ = 0,18, indiquent une $F_{0,1}$ de 5 100 t pour 1988.

## Introduction

### TAC - Catch history

This stock came under quota regulation in 1974, when a TAC of 11,000 t was set, based on average catches. Since 1977, the TAC's have been between 4,000 and 6,000 t, with 5,000 t representing the level from 1980 to the present. Catches from this stock were at their highest level in the 1968-73 period, when they exceeded 12,000 t on 3 occasions (Table 1). Foreign involvement in this fishery was also at its peak during these years (Fig. 1). From 1974 onward, catches have been taken mainly by Canadian offshore otter trawlers although an inshore fishery does exist, taking 1,252 t in 1986, up from approximately 442 t, 316 t, 207 t and 384 t in the 1982-85 period. The increase in 1986 was due primarily to the 885 t taken in the gillnet sector, compared with only 106 t in 1985. After a decline in the early 1980's, the catch of plaice by Canadian offshore trawlers increased in the 1984-86 period, with peak catches from this sector occurring in the January-March period (Table 2). Preliminary estimates for 1987 show the catch in the first quarter of 1987 to be about 2,000 t, which is only slightly below the 1985 and 1986 catches from this quarter.

## Assessment

### Calculation of catch and weight at age, 1973-86

Because some uncertainties existed with the catch at age in earlier years, and also because weights at age were not available for some of these years (Brodie 1986), it was decided to recalculate these parameters for 1973-81 (Table 3). The catch at age for 1982-85 was taken from the 1986 assessment and adjusted to the reported catch in each year, while the 1986 catch and weights at age were calculated from port sampling of Canadian commercial catches (Table 4). The 1982-85 revisions were generally minor, although the changes to some years in the 1973-81 period were often substantial (Table 5). The weights at age for 1981 appear to be anomalous and warrant further investigation. A check of the cross products (sum of wt. at age times catch at age) for the 1973-81 values showed excellent agreement with the nominal catches in each year, with the exception of 1974, where the cross product was 1097 t or 17% greater than the landings. Table 6 shows the weight at age matrix, with the 1973-81 values being obtained from the recalculations, the 1982-85 values from the 1983-86 assessments of this stock, and the 1986 values from Table 4.

### Catch/effort data

The 1986 assessment of this stock presented a CPUE series for Canadian offshore trawlers, TC 4 and 5, which showed a sharp increase in catch rate from 1983 to 1984 and again from 1984 to 1985. This series did not account for possible seasonal variability in the CPUE data, although a correction was applied to equate side trawler effort with stern trawler effort. At the

recommendation of CAFSAC's Groundfish Subcommittee, the multiplicative model of Gavaris (1980) was used to estimate a CPUE series. Data from 1974 to 1986 were used in the model, with NAFO data prior to 1974 being unavailable in the format required, i.e. from catches coded as main species plaice. Only data from Canada were present in sufficient amounts, with Newfoundland and Maritime or Maritime/Quebec taken as separate categories. As is the norm, catches less than 10 t and effort less than 10 hrs were not included in this analysis. Because of uncertainty with prorating of effort data, an unweighted regression was used, rather than weighting with a vector such as log (catch X effort). The results of the catch rate standardization are shown in Table 7, and the CPUE series is plotted, along with the "old" series, in Fig. 2. Clearly, the increase in CPUE from 1983 to 1985 was not caused by seasonal variability in the catch rates, although the magnitude of the increase is smaller in the multiplicative model series. There is a decline in CPUE in 1986, with this point approximating the level indicated by the multiplicative model in 1982-83. Interestingly, there is a wide discrepancy between the 1982-83 and 1986 points in the old series (Fig. 2). It is also interesting to note that the model shows that CPUE for this stock is slightly higher in the July-August period compared to the January-March period, given that the effort is often concentrated in the early part of the year, particularly in 1984-86. In any case, it is obvious that CPUE for this stock increased slightly from the mid 1970's to early 1980's, rose sharply in 1984 and 1985, then declined in 1986, to a level which was still higher than that of the 1974-81 period.

Research vessel survey data

Stratified random surveys have been conducted in Subdiv. 3Ps in each year from 1972 to 1986, using the stratification scheme shown in Fig. 4. Table 8 shows the results from these surveys, and it can be seen that the survey coverage was incomplete in many years prior to 1979, that few strata are common to all surveys, and that large fluctuations occur in the biomass estimates, even between years with relatively equivalent survey coverage, e.g. the 1983-86 period (Brodie, 1985). To attempt to account for inconsistent survey coverage and the fact that different vessel-gear combinations were used in the surveys pre and post-1983, numbers at age, adjusted for differences in vessel fishing power, were calculated for the 1973-86 surveys from selected strata (Tables 9-10). The conversion factors used for the different vessels were from Gavaris and Brodie, 1984, and are different for Am. plaice less than 28 cm and Am. plaice greater than or equal to 28 cm. Figure 3 shows the trend in the total numbers per tow from the selected strata, although it should be noted that this may not be representative of the stock as a whole, in that in some years, less than a third of the Subdiv. 3Ps plaice biomass has been found in these selected strata.

The survey results from 1983 to 1987 are noteworthy in that they were obtained with the same vessel-gear types and coverage is virtually complete in the important strata in each year. The 1985 biomass estimate of 64,000 t (Table 8) is much higher than the surrounding values, and this is caused largely by an estimate of about 19,000 t in stratum 317. Two large catches of plaice in this stratum produced this estimate, which is many times higher than the biomass in this stratum in other surveys. In addition, these fish were much larger than average, as can be seen from the population sizes at ages 12+ in 1985 (Table 10) and the average fish size of about 2.0 kg in the selected

strata estimates (Table 11). Although the commercial CPUE was also at its highest point in 1985, the catches did not contain the proportions of older fish indicated by the survey (Table 5), eg. ages 12+ accounted for 71% of the 6+ survey numbers, but only 27% of the 6+ catch numbers. In any event, the two surveys after 1985 gave biomass estimates for Subdiv. 3Ps of between 30,000 and 34,000 t (Table 8).

## Partial recruitment vector

To obtain a PR vector for use in sequential population analysis (SPA), a standard iterative procedure was used. The PR vector used in the last SPA done on this stock (Brodie and Pitt, 1981) was input into a preliminary SPA run at $F_t$=0.25, and the resulting fishing mortalities for 1983-86 were averaged across ages, creating a new PR. This procedure continued until the output PR differed only marginally from the previous input values. The resulting PR (Table 12) shows higher selectivity at ages 8+, with full recruitment indicated at age 11, as opposed to age 13 in the 1981 PR series.

## Mortality estimates

Z-values from several sources were calculated for this stock (Table 13). Catch curves, based on research vessel survey data, gave Z-values in the range of 0.21 to 0.43 (Fig. 5), while a similar calculation for the 1986 commercial catch at age yielded a figure of 0.71. Paloheimo Z-values, based on commercial catch at age per 10 hours of effort, were around 0.9 for 1986/85, compared to a range of about 0.3 to 0.75 for 1985/84. Because of the very high catch numbers per tow at the older ages in the 1985 survey (Table 9), survival estimates based on 1985/84 vs 1986/85 are completely different, i.e. negative Z values for 1985/84, Z=1.5 for 1986/85.

## Sequential population analysis

Using the catch and weight at age and PR described previously, along with natural mortality of 0.2 and fishing mortalities at age 19 averaged from ages 16 to 19 in a preliminary SPA, a series of SPA was done over a range of terminal F values in 1986. Calibration of exploitable biomass with CPUE was rejected because of uncertainties about the partial recruitment pattern in some years, eg. large fluctuations occurred in the PR pattern between years and these were not explainable by events occurring in the fishery or the population. As well, calibration using age 6+ biomass from SPA vs total biomass from research vessel surveys using the years 1980-86, was not useful in determining F in 1986, mainly because of large variations in recent survey estimates.

The relationship between 8+ biomass from SPA and CPUE was examined for the years 1974-86, excluding 1984 and 85. These 2 years were excluded because the CPUE values were much higher than any others, and these two points, particularly 1985, were very influential in determining the relationship. It was concluded that the regression line through the remaining points, with an intercept of zero, was the suitable criterion for determining the 1986 fishing mortality. This relationship indicated a fully recruited F in 1986 of 0.18 (Table 14, Fig. 6).

## Discussion

The assessment indicates that the 8+ biomass for this stock decreased from about 20,000-25,000 t in 1973-75 to an average of about 16,500 t in 1976-81, and has increased gradually to about 29,000 t in 1986. Fishing mortalities in the 1983-86 period appear to have been slightly below the $F_{0.1}$ level (Table 15).

The projection parameters used are shown in Table 16. The geometric mean value, 1973-80, at age 6 was used to represent the size of the 1981 and 1982 year-classes at age 6 in the projection. The partial recruitment values represent the average over the 1982-85 period as indicated by the SPA, and are lower at ages 8 - 10 than the values used in the SPA for the 1986 population.

Assuming that the TAC of 5,000 t will be taken in 1987, generating a fully recruited F of 0.23, the 1988 catch at $F_{0.1}$ = 0.25 is projected to be 5,100 t (Table 17). With a catch in 1987 at $F_{0.1}$ of 5,300 t, the 1988 catch at $F_{0.1}$ is projected to be 5,000 t.

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Table 1. Catches and TAC's (tons) of American plaice in NAFO Subdivision 3Ps, 1960-86.

| Year | Canada [Nfld. | M&Q | Total] | France | USSR | Other | Total | TAC |
|---|---|---|---|---|---|---|---|---|
| 1960 | 422 | 405 | 827 | 60 | - | - | 887 | - |
| 1961 | 764 | 660 | 1424 | 31 | - | - | 1455 | - |
| 1962 | 659 | 363 | 1022 | 2 | - | - | 1024 | - |
| 1963 | 504 | 25 | 529 | 208 | 1 | 16 | 754 | - |
| 1964 | 1132 | 230 | 1362 | 152 | - | 28 | 1542 | - |
| 1965 | 574 | 1275 | 1849 | 162 | - | 11 | 2022 | - |
| 1966 | 1162 | 1332 | 2494 | 667 | 218 | 27 | 3406 | - |
| 1967 | 2201 | 1074 | 3275 | 533 | 678 | 8 | 4494 | - |
| 1968 | 4007 | 1516 | 5523 | 524 | 8233 | - | 14280 | - |
| 1969 | 2888 | 1178 | 4066 | 245 | 2180 | - | 6491 | - |
| 1970 | 7368 | 4227 | 11595 | 397 | 336 | - | 12328 | - |
| 1971 | 4667 | 1286 | 5953 | 820 | 409 | - | 7182 | - |
| 1972 | 4301 | 1621 | 5922 | 383 | 220 | 13 | 6538 | - |
| 1973 | 10972 | 1840 | 12812 | 547 | 1368 | 42 | 14769 | - |
| 1974 | 5887 | 443 | 6330 | 268 | - | - | 6598 | 11,000 |
| 1975 | 2517 | 1301 | 3818 | 65 | 128 | 200 | 4211 | 11,000 |
| 1976 | 5302 | 128 | 5430 | 5 | 9 | 14 | 5458 | 8,000 |
| 1977 | 4235 | 307 | 4542 | 63 | - | - | 4605 | 6,000 |
| 1978 | 3419 | 192 | 3611 | 47 | - | - | 3658 | 4,000 |
| 1979 | 3405 | 187 | 3592 | 74 | - | - | 3666 | 4,000 |
| 1980 | 2516 | 213 | 2729 | 206 | - | - | 2935 | 5,000 |
| 1981 | 2703 | 57 | 2760 | 457 | - | - | 3217 | 5,000 |
| 1982 | 1823 | 46 | 1869 | 317 | - | - | 2186 | 5,000 |
| 1983 | 1421 | 83 | 1504 | 222 | - | - | 1726 | 5,000 |
| 1984 | 2487 | 138 | 2625 | 338 | - | - | 2963 | 5,000 |
| 1985[a] | 3589 | 206 | 3795 | 406 | - | - | 4201 | 5,000 |
| 1986[a] | 4339 | 109 | 4448 | - | - | 1 | 4449 | 5,000 |
| 1987 | | | | | | | | 5,000 |

[a]Provisional.

Table 2. Nominal catch by month, American plaice in Subdivision 3Ps, 1972-86.

| Year | Jan. | Feb | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sept. | Oct. | Nov. | Dec. | UNK | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1972 | 1118 | 105 | 311 | 161 | 110 | 109 | 391 | 520 | 604 | 880 | 1044 | 1185 | - | 6538 |
| 1973 | 1681 | 500 | 2599 | 1527 | 96 | 350 | 969 | 2607 | 931 | 504 | 2237 | 768 | - | 14769 |
| 1974 | 162 | 133 | 1576 | 2575 | 123 | 137 | 165 | 399 | 567 | 128 | 364 | 269 | - | 6598 |
| 1975 | 6 | 6 | 1495 | 616 | 332 | 280 | 186 | 115 | 120 | 82 | 441 | 532 | - | 4211 |
| 1976 | 98 | 254 | 461 | 191 | 91 | 284 | 439 | 512 | 353 | 433 | 984 | 1358 | - | 5458 |
| 1977 | 28 | 547 | 663 | 339 | 309 | 287 | 414 | 204 | 105 | 261 | 712 | 736 | - | 4605 |
| 1978 | 250 | 141 | 185 | 1066 | 853 | 121 | 433 | 427 | 40 | 41 | 55 | 46 | - | 3658 |
| 1979 | 467 | 376 | 1086 | 212 | 189 | 262 | 225 | 265 | 124 | 161 | 246 | 53 | - | 3666 |
| 1980 | 14 | 464 | 180 | 63 | 216 | 359 | 166 | 170 | 170 | 191 | 256 | 686 | - | 2935 |
| 1981 | 423 | 57 | 236 | 371 | 363 | 331 | 302 | 156 | 214 | 263 | 273 | 228 | - | 3217 |
| 1982 | 53 | 4 | 285 | 315 | 181 | 156 | 133 | 195 | 125 | 95 | 463 | 181 | - | 2186 |
| 1983 | 98 | 47 | 161 | 71 | 61 | 155 | 169 | 91 | 327 | 372 | 149 | 25 | - | 1726 |
| 1984 | 128 | 1933 | 101 | 43 | 125 | 126 | 85 | 60 | 31 | 194 | 94 | 43 | - | 2963 |
| 1985[a] | 3 | 55 | 2814 | 231 | 34 | 153 | 129 | 80 | 198 | 145 | 342 | 17 | - | 4201 |
| 1986[a] | 1954 | 448 | 497 | 29 | 94 | 297 | 260 | 478 | 235 | 68 | 35 | 54 | - | 4449 |

[a]Provisional.

Table 3. Recalculated catch and weight at age, with associated statistics, for A. plaice in the commercial fishery, 1973-81, Subdivision 3Ps.

1973

| AGE | AVERAGE WEIGHT | AVERAGE LENGTH | CATCH MEAN | CATCH STD. ERR. | CATCH C. V. |
|---|---|---|---|---|---|
| 7 | 0.291 | 32.248 | 11 | 8.27 | 0.74 |
| 8 | 0.367 | 34.585 | 864 | 137.42 | 0.16 |
| 9 | 0.481 | 37.467 | 2874 | 249.02 | 0.09 |
| 10 | 0.652 | 41.062 | 4516 | 331.53 | 0.07 |
| 11 | 0.877 | 44.908 | 4207 | 332.13 | 0.08 |
| 12 | 1.183 | 49.126 | 2433 | 249.28 | 0.10 |
| 13 | 1.448 | 52.177 | 1095 | 163.23 | 0.15 |
| 14 | 1.819 | 55.937 | 667 | 110.81 | 0.17 |
| 15 | 2.260 | 59.736 | 294 | 67.77 | 0.23 |
| 16 | 2.641 | 62.578 | 125 | 40.06 | 0.32 |
| 17 | 3.103 | 65.685 | 66 | 29.36 | 0.45 |
| 18 | 3.212 | 66.442 | 19 | 12.25 | 0.65 |
| 19 | 3.636 | 69.000 | 4 | 5.34 | 1.27 |

1974

| AGE | AVERAGE WEIGHT | AVERAGE LENGTH | CATCH MEAN | CATCH STD. ERR. | CATCH C. V. |
|---|---|---|---|---|---|
| * 5 | 0.236 | 30.249 | 37 | 20.28 | 0.55 |
| 6 | 0.291 | 32.163 | 326 | 75.96 | 0.23 |
| 7 | 0.360 | 34.268 | 903 | 125.74 | 0.14 |
| 8 | 0.434 | 36.116 | 889 | 134.63 | 0.15 |
| 9 | 0.539 | 38.614 | 1140 | 148.66 | 0.13 |
| 10 | 0.713 | 42.090 | 1263 | 152.38 | 0.12 |
| *11 | 0.888 | 44.983 | 717 | 113.01 | 0.16 |
| *12 | 1.149 | 48.646 | 792 | 105.32 | 0.13 |
| 13 | 1.424 | 51.945 | 801 | 89.08 | 0.11 |
| 14 | 1.846 | 56.157 | 422 | 64.91 | 0.15 |
| 15 | 2.065 | 58.085 | 186 | 41.06 | 0.22 |
| 16 | 2.612 | 62.374 | 198 | 40.07 | 0.20 |
| 17 | 2.602 | 62.287 | 132 | 35.78 | 0.27 |
| 18 | 3.247 | 66.480 | 137 | 33.21 | 0.24 |
| *19 | 3.834 | 70.028 | 57 | 24.95 | 0.44 |
| 20 | 3.297 | 67.000 | 5 | 3.49 | 0.72 |
| 21 | 3.297 | 67.000 | 2 | 2.50 | 1.03 |

1975

| AGE | AVERAGE WEIGHT | AVERAGE LENGTH | CATCH MEAN | CATCH STD. ERR. | CATCH C. V. |
|---|---|---|---|---|---|
| * 5 | 0.226 | 29.808 | 65 | 23.84 | 0.37 |
| 6 | 0.292 | 32.221 | 391 | 58.80 | 0.15 |
| 7 | 0.400 | 35.373 | 839 | 113.29 | 0.14 |
| 8 | 0.538 | 38.660 | 721 | 122.62 | 0.17 |
| 9 | 0.586 | 39.650 | 644 | 103.80 | 0.16 |
| 10 | 0.791 | 43.451 | 383 | 76.81 | 0.20 |
| 11 | 0.885 | 44.883 | 423 | 78.76 | 0.19 |
| *12 | 1.263 | 49.952 | 490 | 62.59 | 0.13 |
| 13 | 1.414 | 51.746 | 361 | 53.65 | 0.15 |
| *14 | 1.673 | 54.461 | 258 | 47.08 | 0.18 |
| 15 | 2.058 | 58.094 | 61 | 15.38 | 0.25 |
| 16 | 2.402 | 60.806 | 91 | 19.69 | 0.22 |
| 17 | 2.686 | 62.846 | 79 | 19.71 | 0.25 |
| *18 | 3.043 | 65.111 | 51 | 15.32 | 0.30 |
| *19 | 2.969 | 64.574 | 44 | 14.89 | 0.34 |
| *20 | 3.441 | 67.513 | 15 | 6.47 | 0.43 |
| 21 | 3.297 | 67.000 | 3 | 3.36 | 1.07 |
| 22 | | | | | |
| 23 | 5.236 | 77.000 | 3 | 3.34 | 1.26 |

1976

| AGE | AVERAGE WEIGHT | AVERAGE LENGTH | CATCH MEAN | CATCH STD. ERR. | CATCH C. V. |
|---|---|---|---|---|---|
| * 4 | 0.124 | 25.000 | 1 | 0.02 | 0.02 |
| * 5 | 0.217 | 29.258 | 7 | 3.37 | 0.50 |
| * 6 | 0.300 | 32.486 | 121 | 24.04 | 0.20 |
| * 7 | 0.352 | 34.027 | 445 | 48.51 | 0.11 |
| * 8 | 0.439 | 36.289 | 1117 | 88.09 | 0.08 |
| 9 | 0.546 | 38.758 | 1514 | 101.37 | 0.07 |
| 10 | 0.653 | 40.925 | 1266 | 92.06 | 0.07 |
| 11 | 0.829 | 44.043 | 979 | 75.90 | 0.08 |
| 12 | 1.035 | 47.079 | 715 | 62.02 | 0.09 |
| *13 | 1.281 | 50.204 | 460 | 45.64 | 0.10 |
| 14 | 1.523 | 52.939 | 223 | 30.46 | 0.14 |
| *15 | 1.736 | 54.929 | 162 | 24.72 | 0.15 |
| *16 | 2.041 | 57.707 | 127 | 20.72 | 0.16 |
| 17 | 2.435 | 60.773 | 50 | 12.54 | 0.25 |
| *18 | 3.012 | 65.031 | 41 | 9.42 | 0.23 |
| 19 | 3.439 | 67.837 | 2 | 2.15 | 0.86 |
| 20 | 3.998 | 71.000 | 1 | 1.71 | 1.18 |
| 21 | 3.998 | 71.000 | 1 | 1.71 | 1.18 |

1977

| AGE | AVERAGE WEIGHT | AVERAGE LENGTH | CATCH MEAN | CATCH STD. ERR. | CATCH C. V. |
|---|---|---|---|---|---|
| * 5 | 0.102 | 23.206 | 3 | 0.04 | 0.01 |
| * 6 | 0.264 | 31.076 | 18 | 5.17 | 0.29 |
| 7 | 0.317 | 32.905 | 133 | 21.47 | 0.16 |
| * 8 | 0.347 | 33.783 | 330 | 38.45 | 0.12 |
| 9 | 0.435 | 36.134 | 803 | 60.28 | 0.08 |
| 10 | 0.647 | 40.508 | 905 | 69.35 | 0.08 |
| 11 | 0.777 | 42.982 | 952 | 63.48 | 0.07 |
| *12 | 1.048 | 47.057 | 343 | 37.00 | 0.11 |
| *13 | 1.408 | 51.528 | 288 | 36.77 | 0.13 |
| 14 | 1.611 | 53.582 | 245 | 34.29 | 0.14 |
| 15 | 1.835 | 55.766 | 223 | 33.94 | 0.15 |
| 16 | 2.071 | 57.821 | 235 | 33.36 | 0.14 |
| 17 | 2.361 | 59.988 | 157 | 24.14 | 0.15 |
| *18 | 2.736 | 63.104 | 102 | 17.85 | 0.17 |
| *19 | 3.243 | 66.386 | 34 | 9.68 | 0.28 |
| *20 | 3.844 | 70.125 | 12 | 5.43 | 0.47 |
| 21 | 3.634 | 68.887 | 8 | 4.86 | 0.59 |

Table 3 Cont'd.



1978

| AGE | AVERAGE WEIGHT | AVERAGE LENGTH | CATCH MEAN | CATCH STD. ERR. | CATCH C. V. |
|---|---|---|---|---|---|
| 5 | 0.161 | 27.000 | 1 | 1.40 | 1.28 |
| *6 | 0.311 | 32.664 | 49 | 17.55 | 0.36 |
| 7 | 0.322 | 33.071 | 196 | 39.48 | 0.20 |
| 8 | 0.388 | 34.782 | 482 | 63.84 | 0.13 |
| 9 | 0.491 | 37.559 | 964 | 90.69 | 0.09 |
| 10 | 0.575 | 39.294 | 1011 | 99.19 | 0.10 |
| 11 | 0.814 | 43.519 | 756 | 90.99 | 0.12 |
| 12 | 0.976 | 45.791 | 726 | 81.62 | 0.11 |
| *13 | 1.145 | 47.994 | 324 | 50.38 | 0.16 |
| 14 | 1.239 | 48.871 | 225 | 37.08 | 0.16 |
| 15 | 1.770 | 54.785 | 123 | 28.63 | 0.23 |
| *16 | 2.478 | 61.190 | 75 | 16.59 | 0.22 |
| 17 | 2.688 | 62.416 | 20 | 7.86 | 0.38 |
| 18 | 2.736 | 63.173 | 11 | 7.60 | 0.68 |
| *19 | 4.120 | 71.424 | 6 | 1.02 | 0.16 |
| 20 | | | | | |
| 21 | | | | | |
| 22 | | | | | |
| 23 | | | | | |
| 24 | | | | | |
| *25 | 6.196 | 81.000 | 3 | 0.05 | 0.02 |

1979

| AGE | AVERAGE WEIGHT | AVERAGE LENGTH | CATCH MEAN | CATCH STD. ERR. | CATCH C. V. |
|---|---|---|---|---|---|
| *4 | 0.204 | 29.000 | 1 | 0.91 | 0.69 |
| 5 | 0.251 | 30.856 | 9 | 3.51 | 0.38 |
| 6 | 0.366 | 34.492 | 130 | 25.56 | 0.20 |
| 7 | 0.448 | 36.564 | 240 | 41.25 | 0.17 |
| 8 | 0.474 | 36.996 | 574 | 59.43 | 0.10 |
| 9 | 0.585 | 39.356 | 908 | 70.12 | 0.08 |
| 10 | 0.761 | 42.448 | 820 | 64.04 | 0.08 |
| 11 | 1.026 | 46.501 | 608 | 50.24 | 0.08 |
| 12 | 1.335 | 50.540 | 349 | 36.68 | 0.11 |
| 13 | 1.784 | 55.275 | 225 | 29.85 | 0.13 |
| *14 | 2.147 | 58.623 | 149 | 23.81 | 0.16 |
| *15 | 2.387 | 60.545 | 117 | 20.10 | 0.17 |
| 16 | 2.981 | 64.853 | 43 | 10.69 | 0.25 |
| 17 | 3.207 | 66.229 | 23 | 7.54 | 0.33 |
| 18 | 2.981 | 65.000 | 3 | 2.69 | 1.01 |

1980

| AGE | AVERAGE WEIGHT | AVERAGE LENGTH | CATCH MEAN | CATCH STD. ERR. | CATCH C. V. |
|---|---|---|---|---|---|
| *6 | 0.161 | 27.000 | 2 | 0.05 | 0.03 |
| *7 | 0.332 | 33.477 | 121 | 42.64 | 0.35 |
| *8 | 0.390 | 35.046 | 491 | 63.63 | 0.13 |
| 9 | 0.491 | 37.479 | 737 | 85.56 | 0.12 |
| 10 | 0.571 | 39.082 | 725 | 85.91 | 0.12 |
| *11 | 0.787 | 43.030 | 600 | 70.01 | 0.12 |
| 12 | 0.974 | 45.814 | 545 | 61.58 | 0.11 |
| 13 | 1.358 | 50.799 | 364 | 38.39 | 0.11 |
| *14 | 2.086 | 58.050 | 71 | 14.14 | 0.20 |
| 15 | 2.099 | 57.937 | 81 | 15.27 | 0.19 |
| 16 | 2.523 | 61.514 | 50 | 10.23 | 0.20 |
| 17 | 2.977 | 64.905 | 23 | 6.31 | 0.27 |
| 18 | 3.186 | 66.226 | 14 | 5.22 | 0.37 |
| 19 | | | | | |
| 20 | 3.998 | 71.000 | 1 | 1.48 | 1.35 |

1981

| AGE | AVERAGE WEIGHT | AVERAGE LENGTH | CATCH MEAN | CATCH STD. ERR. | CATCH C. V. |
|---|---|---|---|---|---|
| 4 | 0.204 | 29.000 | 1 | 1.28 | 1.12 |
| 5 | 0.285 | 32.010 | 22 | 10.67 | 0.50 |
| 6 | 0.349 | 34.014 | 52 | 17.06 | 0.33 |
| 7 | 0.452 | 36.529 | 281 | 39.69 | 0.14 |
| 8 | 0.505 | 37.579 | 628 | 54.24 | 0.09 |
| 9 | 0.501 | 37.493 | 884 | 60.84 | 0.07 |
| 10 | 0.646 | 40.508 | 512 | 47.08 | 0.09 |
| *11 | 0.765 | 42.731 | 375 | 36.98 | 0.10 |
| 12 | 0.937 | 45.192 | 257 | 24.91 | 0.10 |
| *13 | 0.894 | 44.449 | 288 | 22.85 | 0.08 |
| *14 | 0.958 | 45.829 | 360 | 25.11 | 0.07 |
| 15 | 1.194 | 49.188 | 339 | 23.51 | 0.07 |
| *16 | 1.662 | 54.222 | 142 | 16.23 | 0.11 |
| 17 | 1.904 | 56.686 | 103 | 12.76 | 0.12 |
| 18 | 2.269 | 59.817 | 38 | 7.21 | 0.19 |
| 19 | 2.707 | 63.081 | 20 | 4.53 | 0.23 |
| *20 | 3.264 | 66.647 | 12 | 3.24 | 0.27 |
| 21 | 3.636 | 69.000 | 1 | 1.17 | 0.81 |

Table 4a. List of commercial sampling by quarter available for 1986, for American plaice in Subdivision 3Ps.

| | Quarter | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | Total |
| Can(N) Offshore catch (t) | 2858 | 96 | 89 | 45 | 3088 |
| Samples | 18 | - | 1 | - | 19 |
| Measured | 6714 | - | 414 | - | 7128 |
| Otoliths | 899 | - | 93 | - | 992 |
| Can(N) Inshore catch (t) | - | 78 | 888 | 285 | 1251 |
| Samples | - | - | 1 | - | 1 |
| Measured | - | - | 262 | - | 262 |
| Otoliths | - | - | 77 | - | 77 |

Table 4b) Catch and weight at age, with associated statistics, for A. plaice in the commercial fishery in 1986, Subdivision 3Ps.

| | AVERAGE | | CATCH | | |
|---|---|---|---|---|---|
| AGE | WEIGHT | LENGTH | MEAN | STD. ERR. | C. V. |
| * 6 | 0.291 | 32.135 | 3 | 1.26 | 0.50 |
| 7 | 0.361 | 34.364 | 63 | 9.18 | 0.15 |
| 8 | 0.448 | 36.677 | 252 | 22.31 | 0.09 |
| * 9 | 0.556 | 39.116 | 449 | 34.74 | 0.08 |
| 10 | 0.699 | 41.844 | 737 | 44.94 | 0.06 |
| 11 | 0.852 | 44.371 | 1004 | 48.00 | 0.05 |
| 12 | 1.165 | 48.777 | 827 | 57.25 | 0.07 |
| 13 | 1.466 | 52.265 | 360 | 48.69 | 0.14 |
| *14 | 1.870 | 56.265 | 314 | 27.38 | 0.09 |
| 15 | 2.322 | 60.099 | 162 | 17.79 | 0.11 |
| 16 | 2.844 | 63.841 | 67 | 9.84 | 0.15 |
| 17 | 3.574 | 68.566 | 20 | 3.66 | 0.19 |
| *18 | 3.865 | 70.212 | 7 | 0.96 | 0.14 |
| *19 | 5.236 | 77.000 | | | 0.01 |

Table 5a) "Old" catch matrix, 3Ps plaice, 1973-85 (taken from 1986 assessment).

| AGE | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 46 | 312 | 264 | 121 | 24 | 53 | 97 | 2 | 9 | 2 | 5 | 4 | 3 |
| 7 | 568 | 783 | 619 | 442 | 150 | 206 | 182 | 148 | 115 | 29 | 77 | 14 | 27 |
| 8 | 823 | 857 | 613 | 1110 | 370 | 498 | 545 | 609 | 510 | 193 | 371 | 109 | 359 |
| 9 | 1170 | 1165 | 570 | 1499 | 896 | 994 | 900 | 925 | 929 | 390 | 440 | 613 | 945 |
| 10 | 941 | 1221 | 422 | 1249 | 917 | 1033 | 845 | 897 | 539 | 801 | 620 | 1170 | 1153 |
| 11 | 2003 | 777 | 403 | 963 | 1055 | 769 | 654 | 720 | 429 | 1142 | 463 | 1223 | 957 |
| 12 | 1344 | 880 | 480 | 705 | 384 | 729 | 382 | 633 | 214 | 463 | 303 | 667 | 550 |
| 13 | 1272 | 844 | 401 | 454 | 280 | 329 | 241 | 401 | 114 | 198 | 237 | 357 | 275 |
| 14 | 1140 | 490 | 239 | 219 | 249 | 228 | 162 | 73 | 90 | 125 | 82 | 234 | 183 |
| 15 | 974 | 220 | 77 | 161 | 191 | 120 | 133 | 87 | 70 | 44 | 14 | 112 | 123 |
| 16 | 827 | 173 | 100 | 127 | 209 | 76 | 48 | 50 | 34 | 22 | 11 | 43 | 65 |
| 17 | 426 | 96 | 95 | 99 | 138 | 21 | 25 | 21 | 18 | 12 | 3 | 12 | 43 |
| 18 | 377 | 145 | 64 | 42 | 91 | 11 | 3 | 12 | 7 | 5 | 1 | 6 | 16 |
| 19 | 239 | 61 | 60 | 3 | 31 | 5 | 1 | 1 | 3 | 1 | 1 | 1 | 4 |

Table 5b) Recalculated catch matrix, 3Ps plaice, 1973-86.

| AGE | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1 | 326 | 391 | 121 | 18 | 49 | 130 | 2 | 52 | 2 | 5 | 4 | 3 | 3 |
| 7 | 11 | 903 | 839 | 445 | 133 | 196 | 240 | 121 | 281 | 28 | 83 | 14 | 28 | 63 |
| 8 | 864 | 889 | 721 | 1117 | 330 | 482 | 574 | 491 | 628 | 186 | 401 | 107 | 378 | 252 |
| 9 | 2874 | 1140 | 644 | 1514 | 803 | 964 | 908 | 737 | 884 | 377 | 476 | 603 | 995 | 449 |
| 10 | 4516 | 1263 | 383 | 1266 | 905 | 1011 | 820 | 725 | 512 | 774 | 670 | 1151 | 1214 | 737 |
| 11 | 4207 | 717 | 423 | 979 | 952 | 756 | 608 | 600 | 375 | 1103 | 501 | 1203 | 1008 | 1004 |
| 12 | 2433 | 792 | 490 | 715 | 343 | 726 | 349 | 545 | 257 | 447 | 328 | 656 | 579 | 827 |
| 13 | 1095 | 801 | 361 | 460 | 288 | 324 | 225 | 364 | 288 | 191 | 256 | 351 | 290 | 360 |
| 14 | 667 | 422 | 258 | 223 | 245 | 225 | 149 | 71 | 360 | 121 | 89 | 230 | 193 | 314 |
| 15 | 294 | 186 | 61 | 162 | 223 | 123 | 117 | 81 | 339 | 43 | 15 | 110 | 130 | 162 |
| 16 | 125 | 198 | 91 | 127 | 235 | 75 | 43 | 50 | 142 | 21 | 12 | 42 | 68 | 67 |
| 17 | 66 | 132 | 79 | 50 | 157 | 20 | 23 | 23 | 103 | 12 | 3 | 12 | 45 | 20 |
| 18 | 19 | 137 | 51 | 41 | 102 | 11 | 3 | 14 | 38 | 5 | 1 | 6 | 17 | 7 |
| 19 | 4 | 57 | 44 | 2 | 34 | 6 | 1 | 1 | 20 | 1 | 1 | 1 | 4 | 1 |

PERCENT CATCH AT AGE

| AGE | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 0.0 | 4.1 | 8.1 | 1.7 | 0.4 | 1.0 | 3.1 | 0.1 | 1.2 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 |
| 7 | 0.1 | 11.3 | 17.3 | 6.2 | 2.8 | 3.9 | 5.7 | 3.2 | 6.6 | 0.8 | 2.9 | 0.3 | 0.6 | 1.5 |
| 8 | 5.0 | 11.2 | 14.9 | 15.5 | 6.9 | 9.7 | 13.7 | 12.8 | 14.7 | 5.6 | 14.1 | 2.4 | 7.6 | 5.9 |
| 9 | 16.7 | 14.3 | 13.3 | 21.0 | 16.8 | 19.4 | 21.7 | 19.3 | 20.7 | 11.4 | 16.8 | 13.4 | 20.1 | 10.5 |
| 10 | 26.3 | 15.9 | 7.9 | 17.5 | 19.0 | 20.4 | 19.6 | 19.0 | 12.0 | 23.4 | 23.6 | 25.6 | 24.5 | 17.3 |
| 11 | 24.5 | 9.0 | 8.7 | 13.6 | 20.0 | 15.2 | 14.5 | 15.7 | 8.8 | 33.3 | 17.6 | 26.8 | 20.4 | 23.5 |
| 12 | 14.2 | 9.9 | 10.1 | 9.9 | 7.2 | 14.6 | 8.3 | 14.2 | 6.0 | 13.5 | 11.5 | 14.6 | 11.7 | 19.4 |
| 13 | 6.4 | 10.1 | 7.5 | 6.4 | 6.0 | 6.5 | 5.4 | 9.5 | 6.7 | 5.8 | 9.0 | 7.8 | 5.9 | 8.4 |
| 14 | 3.9 | 5.3 | 5.3 | 3.1 | 5.1 | 4.5 | 3.6 | 1.9 | 8.4 | 3.7 | 3.1 | 5.1 | 3.9 | 7.4 |
| 15 | 1.7 | 2.3 | 1.3 | 2.2 | 4.7 | 2.5 | 2.8 | 2.1 | 7.9 | 1.3 | 0.5 | 2.4 | 2.6 | 3.8 |
| 16 | 0.7 | 2.5 | 1.9 | 1.8 | 4.9 | 1.5 | 1.0 | 1.3 | 3.3 | 0.6 | 0.4 | 0.9 | 1.4 | 1.6 |
| 17 | 0.4 | 1.7 | 1.6 | 0.7 | 3.3 | 0.4 | 0.5 | 0.6 | 2.4 | 0.4 | 0.1 | 0.3 | 0.9 | 0.5 |
| 18 | 0.1 | 1.7 | 1.1 | 0.6 | 2.1 | 0.2 | 0.1 | 0.4 | 0.9 | 0.2 | 0.0 | 0.1 | 0.3 | 0.2 |
| 19 | 0.0 | 0.7 | 0.9 | 0.0 | 0.7 | 0.1 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 |

Table 5c) Difference between old and new catch matrices.

| AGE | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 45 | -14 | -127 | 0 | 6 | 4 | -33 | 0 | -43 | 0 | 0 | 0 | 0 |
| 7 | 557 | -120 | -220 | -3 | 17 | 10 | -38 | 27 | -166 | 1 | -6 | 0 | -1 |
| 8 | -41 | -32 | -108 | -7 | 40 | 16 | -29 | 118 | -118 | 7 | -30 | 2 | -19 |
| 9 | -1704 | 25 | -74 | -15 | 93 | 30 | -8 | 188 | 45 | 13 | -36 | 10 | -50 |
| 10 | -3575 | -42 | 39 | -17 | 12 | 22 | 25 | 172 | 27 | 27 | -50 | 19 | -61 |
| 11 | -2204 | 60 | -20 | -16 | 103 | 13 | 46 | 120 | 54 | 39 | -38 | 20 | -51 |
| 12 | -1089 | 88 | -10 | -10 | 41 | 3 | 33 | 88 | -43 | 16 | -25 | 11 | -29 |
| 13 | 177 | 43 | 40 | -6 | -8 | 5 | 16 | 37 | -174 | 7 | -19 | 6 | -15 |
| 14 | 473 | 68 | -19 | -4 | 4 | 3 | 13 | 2 | -270 | 4 | -7 | 4 | -10 |
| 15 | 680 | 34 | 16 | -1 | -32 | -3 | 16 | 6 | -269 | 1 | -1 | 2 | -7 |
| 16 | 702 | -25 | 9 | 0 | -26 | 1 | 5 | 0 | -108 | 1 | -1 | 1 | -3 |
| 17 | 360 | -36 | 16 | 49 | -19 | 1 | 2 | -2 | -85 | 0 | 0 | 0 | -2 |
| 18 | 358 | 8 | 13 | 1 | -11 | 0 | 0 | -2 | -31 | 0 | 0 | 0 | -1 |
| 19 | 235 | 4 | 16 | 1 | -3 | -1 | 0 | 0 | -17 | 0 | 0 | 0 | 0 |

Table 6. Weights at age (kg), 3Ps plaice, from the commercial fishery, 1973-86.

| AGE | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 0.291 | 0.291 | 0.292 | 0.300 | 0.264 | 0.311 | 0.366 | 0.161 | 0.349 | 0.303 | 0.286 | 0.278 | 0.204 | 0.291 |
| 7 | 0.291 | 0.360 | 0.400 | 0.352 | 0.317 | 0.322 | 0.448 | 0.332 | 0.452 | 0.425 | 0.415 | 0.303 | 0.273 | 0.361 |
| 8 | 0.367 | 0.434 | 0.538 | 0.439 | 0.347 | 0.388 | 0.474 | 0.390 | 0.505 | 0.419 | 0.459 | 0.357 | 0.358 | 0.448 |
| 9 | 0.481 | 0.539 | 0.586 | 0.546 | 0.435 | 0.491 | 0.585 | 0.491 | 0.501 | 0.448 | 0.558 | 0.421 | 0.484 | 0.556 |
| 10 | 0.652 | 0.713 | 0.791 | 0.653 | 0.647 | 0.575 | 0.761 | 0.571 | 0.646 | 0.513 | 0.672 | 0.515 | 0.647 | 0.699 |
| 11 | 0.877 | 0.888 | 0.885 | 0.829 | 0.777 | 0.814 | 1.026 | 0.787 | 0.765 | 0.656 | 0.714 | 0.638 | 0.884 | 0.852 |
| 12 | 1.183 | 1.149 | 1.263 | 1.035 | 1.048 | 0.976 | 1.335 | 0.974 | 0.937 | 0.924 | 0.856 | 0.841 | 1.214 | 1.185 |
| 13 | 1.448 | 1.424 | 1.414 | 1.281 | 1.408 | 1.145 | 1.784 | 1.358 | 0.394 | 1.194 | 0.948 | 1.074 | 1.524 | 1.466 |
| 14 | 1.819 | 1.846 | 1.673 | 1.523 | 1.611 | 1.239 | 2.147 | 2.086 | 0.958 | 1.541 | 1.507 | 1.314 | 1.907 | 1.870 |
| 15 | 2.260 | 2.065 | 2.058 | 1.736 | 1.835 | 1.770 | 2.387 | 2.099 | 1.194 | 1.978 | 1.924 | 1.766 | 2.356 | 2.322 |
| 16 | 2.641 | 2.612 | 2.402 | 2.041 | 2.071 | 2.478 | 2.981 | 2.523 | 1.662 | 2.339 | 2.416 | 2.423 | 2.739 | 2.844 |
| 17 | 3.103 | 2.602 | 2.686 | 2.435 | 2.361 | 2.698 | 3.207 | 2.977 | 1.904 | 2.739 | 2.858 | 2.610 | 3.222 | 3.574 |
| 18 | 3.212 | 3.247 | 3.043 | 3.012 | 2.736 | 2.736 | 2.981 | 3.186 | 2.269 | 3.329 | 3.733 | 3.116 | 3.454 | 3.865 |
| 19 | 3.636 | 3.834 | 2.969 | 3.439 | 3.243 | 4.120 | 3.207 | 3.186 | 2.707 | 3.659 | 4.798 | 3.297 | 3.636 | 5.236 |

Table 7. Regression coefficients and analysis of variance from the regression of ln catch rate of A. plaice in Subdivision 3Ps for the years 1974-86.

| Country-Gear-TC | Ln Power | Month | Ln Power |
|---|---|---|---|
| Can(N) OT Side 4 | -0.216 | May | -0.688 |
| Can(N) OT Stern 4 | | | |
| | | June, September, October, November | -0.404 |
| Can(M, MQ) OT Stern 5 | | | |
| Can(N) OT Stern 5 | 0.000 | | |
| Can(MQ) OT Side 4 | | | |
| | | April | -0.247 |
| | | December | -0.129 |
| | | January, February, March | 0.000 |
| | | August | 0.004 |
| | | July | 0.112 |

REGRESSION OF MULTIPLICATIVE MODEL

MULTIPLE R..... 0.723
MULTIPLE R SQUARED..... 0.522

ANALYSIS OF VARIANCE

| SOURCE OF VARIATION | DF | SUMS OF SQUARES | MEAN SQUARES | F-VALUE |
|---|---|---|---|---|
| INTERCEPT | 1 | 2.792E2 | 2.792E2 | |
| REGRESSION | 19 | 2.995E1 | 1.576E0 | 13.336 |
| TYPE 1 | 1 | 2.726E0 | 2.726E0 | 23.065 |
| TYPE 2 | 6 | 1.172E1 | 1.953E0 | 16.521 |
| TYPE 3 | 12 | 1.249E1 | 1.041E0 | 8.809 |
| RESIDUALS | 232 | 2.742E1 | 1.182E-1 | |
| TOTAL | 252 | 3.366E2 | | |

REGRESSION COEFFICIENTS

| VARIABLE | COEFFICIENT | STD. ERROR | NO. OBS. |
|---|---|---|---|
| INTERCEPT | -0.835 | 0.076 | 252 |
| 1 | -0.216 | 0.045 | 111 |
| 2 | -0.247 | 0.075 | 33 |
| 3 | -0.688 | 0.098 | 16 |
| 4 | -0.404 | 0.058 | 82 |
| 5 | 0.112 | 0.103 | 14 |
| 6 | 0.004 | 0.088 | 21 |
| 7 | -0.129 | 0.089 | 21 |
| 8 | 0.069 | 0.099 | 20 |
| 9 | -0.157 | 0.092 | 26 |
| 10 | -0.012 | 0.090 | 28 |
| 11 | -0.092 | 0.097 | 23 |
| 12 | 0.058 | 0.091 | 27 |
| 13 | -0.062 | 0.098 | 21 |
| 14 | 0.137 | 0.101 | 19 |
| 15 | 0.365 | 0.107 | 16 |
| 16 | 0.229 | 0.112 | 14 |
| 17 | 0.626 | 0.138 | 8 |
| 18 | 0.899 | 0.137 | 8 |
| 19 | 0.322 | 0.123 | 11 |

PREDICTED CATCH RATE

| | LN TRANSFORM | | RETRANSFORMED | | | |
|---|---|---|---|---|---|---|
| YEAR | MEAN | S.E. | MEAN | S.E. | CATCH | EFFORT |
| 1974 | -0.8353 | 0.0057 | 0.459 | 0.035 | 6598 | 14376 |
| 1975 | -0.7661 | 0.0082 | 0.491 | 0.045 | 4211 | 8573 |
| 1976 | -0.9922 | 0.0066 | 0.392 | 0.032 | 5458 | 13919 |
| 1977 | -0.8468 | 0.0061 | 0.454 | 0.035 | 4605 | 10152 |
| 1978 | -0.9270 | 0.0075 | 0.418 | 0.036 | 3658 | 8744 |
| 1979 | -0.7769 | 0.0064 | 0.486 | 0.039 | 3666 | 7537 |
| 1980 | -0.8971 | 0.0081 | 0.431 | 0.039 | 2935 | 6811 |
| 1981 | -0.6987 | 0.0083 | 0.525 | 0.048 | 3217 | 6122 |
| 1982 | -0.4705 | 0.0099 | 0.660 | 0.066 | 2186 | 3314 |
| 1983 | -0.6062 | 0.0107 | 0.576 | 0.059 | 1726 | 2998 |
| 1984 | -0.2098 | 0.0158 | 0.854 | 0.107 | 2963 | 3471 |
| 1985 | 0.0642 | 0.0161 | 1.122 | 0.142 | 4201 | 3743 |
| 1986 | -0.5136 | 0.0115 | 0.631 | 0.068 | 4449 | 7048 |

Table 8. Mean weight (kg) of American plaice per tow, by stratum, from R. V. surveys in Subdivision 3Ps. Numbers in parentheses are the number of successful 30 minute tows in each stratum. The stratified mean weight per tow and the biomass estimates are given at the bottom of the table. (ATC, AN, WT, refers to the research vessels, A.T. CAMERON, A. NEEDLER and W. TEMPLEMAN respectively). Strata marked with an asterisk were used in the calculation of abundance and biomass in Tables 9, 10 and 11.

| Depth (fm) | Stratum | Year - Survey | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1972 ATC 197 | 1973 ATC 207 | 1974 ATC 221 | 1975 ATC 234 | 1976 ATC 247 | 1977 ATC 261 | 1978 ATC 275 | 1979 ATC 287 | 1980 ATC 302 | 1981 ATC 316 | 1982 ATC 330 | 1983 AN 9 | 1984 AN 26 | 1985 WT 26 | 1986 WT 45 | 1987 WT 55,56 |
| 101-150 | 306 | - | - | 0.3(6) | 0.4(4) | 0.6(2) | 0.5(6) | 1.0(6) | 1.4(5) | 1.1(2) | 0.6(3) | 0.5(3) | 0.2(4) | 0.1(2) | 2.7(2) | 0.6(3) | 0.2(4) |
| 51-100 | 307* | 0.0(3) | 0.0(5) | 1.9(7) | 0.4(4) | 1.4(4) | 1.1(4) | 0.1(4) | 0.1(4) | 1.6(2) | 0.9(3) | 2.5(4) | 1.3(4) | 0.0(2) | 0.1(3) | 1.0(3) | 0.4(3) |
| 31-50 | 308* | - | 0.7(2) | 28.1(2) | 17.3(4) | 16.3(2) | 18.8(4) | - | 0.7(4) | 4.0(2) | 306.5(2) | 49.3(2) | 101.2(3) | 1.5(2) | 3.7(2) | 0.0(2) | 0.0(2) |
| 101-150 | 309* | 0.0(2) | 1.2(3) | 0.1(4) | 2.6(6) | 0.5(3) | 1.1(6) | 1.3(6) | 3.9(6) | 0.7(2) | 1.5(2) | 0.4(2) | 0.3(3) | 7.3(2) | 1.6(3) | 0.2(2) | 0.5(2) |
| 101-150 | 310* | - | - | 0.2(3) | 1.5(6) | - | 0.3(6) | 0.5(6) | 1.7(6) | 3.0(2) | 3.0(2) | 1.0(3) | 0.2(3) | 0.5(2) | 4.2(3) | 2.0(2) | 3.5(2) |
| 51-100 | 311* | 8.1(4) | 109.1(9) | 13.4(8) | 8.8(4) | 12.6(6) | 3.9(4) | 5.9(4) | 40.4(4) | 108.5(2) | 10.0(2) | 2.7(3) | 2.0(3) | 2.6(2) | 16.2(4) | 77.0(3) | 27.0(2) |
| 31-50 | 312 | 249.5(2) | - | 43.3(2) | 18.4(3) | 20.6(5) | 12.5(4) | - | 0.1(3) | - | 1.2(2) | 5.3(2) | 12.2(3) | 0.6(2) | 1.5(2) | 4.0(2) | 2.8(2) |
| 101-150 | 313* | 0.5(2) | 168.3(2) | 0.7(5) | 0.4(3) | 1.2(3) | 0.5(10) | 4.1(2) | 4.0(5) | 2.6(2) | 21.5(2) | 1.2(2) | 2.9(3) | 0.7(2) | 0.9(2) | 9.7(2) | 1.6(2) |
| 0-30 | 314 | 28.6(2) | - | 0.2(2) | - | 1.1(2) | 16.3(4) | - | - | 0.5(2) | 0.3(5) | 23.3(5) | 11.9(7) | 5.3(4) | 0.5(7) | 2.0(8) | 6.0(5) |
| 31-50 | 315 | 71.7(2) | 48.3(2) | 103.0(2) | - | 32.7(5) | 27.2(4) | - | 5.3(3) | 48.1(4) | 33.0(2) | 53.5(3) | 61.4(8) | 35.3(5) | 40.9(7) | 62.5(6) | 33.1(8) |
| 101-150 | 316* | 3.2(2) | 23.0(3) | 0.4(6) | - | 0.8(4) | 3.7(6) | 4.0(6) | 12.0(3) | 7.5(2) | 18.9(2) | - | 5.3(4) | 1.7(2) | 3.8(3) | 7.0(2) | 196.8(3) |
| 51-100 | 317* | 64.9(4) | 161.7(7) | 30.2(8) | 9.9(4) | 5.1(4) | 1.4(4) | 51.3(4) | 249.6(3) | 318.4(2) | 56.0(2) | 34.2(3) | 52.0(3) | 6.0(2) | 1312.8(2) | 29.3(2) | 80.0(3) |
| 101-150 | 318* | - | 134.3(2) | 1.8(2) | 0.0(4) | 1.9(2) | 0.7(6) | 10.9(2) | 3.9(2) | 8.9(2) | - | 0.3(2) | 3.6(3) | 7.3(2) | - | 7.0(2) | 37.1(2) |
| 51-100 | 319* | 14.0(4) | 15.6(5) | 61.2(2) | 11.8(4) | 63.0(4) | 48.6(6) | 34.2(4) | 8.1(2) | 39.3(4) | 79.5(2) | 33.0(7) | 112.1(7) | 43.3(6) | 26.5(2) | 27.1(8) | 104.3(9) |
| 0-30 | 320 | - | 2.7(2) | - | - | 11.2(3) | - | - | - | 12.3(6) | 7.0(2) | 18.8(4) | 34.0(14) | 9.4(8) | 38.3(5) | 17.0(9) | 7.0(11) |
| 31-50 | 321 | 90.5(2) | 3.4(2) | - | - | 88.5(2) | - | - | - | 30.5(5) | 45.5(2) | 27.3(4) | 47.2(10) | 28.0(6) | 23.1(7) | 26.9(10) | 21.8(10) |
| 51-100 | 322 | - | - | - | - | 75.1(4) | - | - | 2.8(2) | 67.1(8) | 21.5(2) | 58.0(8) | 71.2(11) | 64.3(8) | 179.2(13) | 55.5(12) | 22.9(10) |
| 51-100 | 323 | 222.6(3) | - | - | - | 111.0(4) | 34.5(2) | - | - | 162.5(3) | 108.5(2) | 256.5(2) | 125.7(6) | 44.4(4) | 68.0(3) | 170.5(5) | 164.8(6) |
| 51-100 | 324 | - | - | - | - | 53.6(2) | - | - | 4.0(2) | 26.8(2) | - | 71.3(2) | 91.5(4) | 15.5(3) | 202.3(2) | 7.5(5) | 95.7(4) |
| 31-50 | 325 | - | - | - | - | 60.4(2) | - | - | 2.7(2) | 7.7(4) | 4.6(2) | 41.4(5) | 53.4(8) | 27.0(5) | 25.7(3) | 6.5(8) | 1.6(6) |
| 31-50 | 326 | - | - | - | - | - | - | - | 15.7(2) | 13.9(2) | 1.9(2) | 44.3(2) | 40.8(3) | 29.8(2) | - | 8.0(2) | 14.3(2) |
| 151-200 | 705 | 0.9(2) | 1.4(2) | 0.8(4) | 0.3(2) | 2.2(2) | 1.1(4) | 0.2(3) | 2.6(4) | 0.5(2) | 0.9(2) | 0.6(2) | 0.5(3) | 0.4(2) | 3.5(2) | 2.2(2) | 3.5(2) |
| 151-200 | 706 | 4.4(2) | 8.2(2) | 2.2(7) | - | - | 3.1(4) | 1.6(2) | 5.6(3) | 1.4(2) | 6.8(2) | 0.6(4) | 1.9(5) | 0.3(2) | 1.8(4) | 7.3(4) | 9.7(5) |
| 151-200 | 707 | 14.9(2) | - | 0.0(2) | 0.4(4) | 0.1(2) | 0.0(4) | 3.6(2) | 2.1(2) | 4.5(2) | - | - | 0.0(3) | 8.1(2) | - | 4.0(2) | 1.0(2) |
| 201-300 | 708 | - | - | - | 0.0(3) | - | 0.2(4) | - | 0.5(2) | 0.6(2) | - | - | 0.2(2) | 1.4(2) | - | 3.6(2) | 1.5(2) |
| 301-400 | 709 | - | - | - | - | - | - | - | - | - | - | - | 0.2(2) | 0.0(2) | - | - | - |
| 301-400 | 710 | - | - | - | - | - | - | - | - | - | - | - | 0.0(3) | 2.5(2) | 1.3(2) | 0.7(2) | - |
| 201-300 | 711 | - | - | - | - | - | - | - | - | 0.2(2) | 0.7(2) | 0.0(2) | 0.8(8) | 0.9(5) | 1.0(8) | 1.4(9) | 2.2(7) |
| 201-300 | 712 | - | - | - | - | - | - | - | 1.4(2) | 0.0(2) | 0.2(2) | 0.0(3) | 0.9(7) | - | 1.0(6) | 0.4(9) | 0.3(4) |
| 201-300 | 713 | - | - | - | 0.6(3) | - | - | - | - | 0.2(2) | 0.9(6) | 0.3(2) | 0.4(7) | - | 0.4(8) | 0.1(5) | 1.0(4) |
| 201-300 | 714 | - | - | - | - | - | - | 0.0(2) | - | 1.0(2) | 0.1(8) | 0.0(6) | 0.3(10) | - | - | 8.8(5) | 0.5(4) |
| 151-200 | 715 | 0.0(2) | - | 0.0(4) | 0.0(2) | 0.2(2) | 0.2(4) | 0.3(4) | 0.4(3) | 0.5(2) | 0.3(2) | 0.2(2) | 0.8(3) | 0.0(2) | - | 1.8(2) | 0.4(2) |
| 151-200 | 716 | 0.0(2) | - | 0.1(3) | - | - | 0.9(6) | 0.4(4) | 2.1(4) | 0.5(2) | 1.8(4) | 0.4(2) | 1.5(4) | 0.2(3) | 4.2(5) | 1.8(4) | 3.8(3) |
| Mean (No. sets) | | 56.8(42) | 26.8(48) | 25.2(79) | 5.1(60) | 42.3(66) | 15.8(102) | 8.6(61) | 9.5(78) | 27.8(80) | 21.0(71) | 30.7(91) | 34.5(171) | 20.8(95) | 54.9(110) | 23.2(144) | 25.9(134) |
| Biomass (t) | | 33,826 | 13,654 | 12,999 | 1,901 | 37,757 | 9,109 | 3,785 | 7,236 | 35,776 | 25,974 | 39,076 | 45,200 | 22,549 | 64,494 | 30,450 | 33,923 |

Table 9. Mean number of American plaice per tow from R.V. surveys in NAFO Subdivision 3Ps. The same strata were used in the calculations for each year.

| Age | ATC207 1973 | ATC221 1974 | ATC234 1975 | ATC247 1976 | ATC261 1977 | ATC275 1978 | ATC287 1979 | ATC302 1980 | ATC316 1981 | ATC330 1982 | AN9 1983 | AN26 1984 | WT26 1985 | WT45 1986 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2 | 0.03 | 0.66 | 0.02 | | 0.03 | - | 0.16 | 0.90 | 0.18 | 0.09 | 0.01 | - | - | - |
| 3 | 3.74 | 4.47 | 1.04 | 0.55 | 0.18 | 1.33 | 0.56 | 4.24 | 1.97 | 1.29 | 0.22 | - | - | 0.12 |
| 4 | 7.62 | 8.89 | 2.70 | 7.23 | 0.74 | 1.46 | 2.98 | 5.56 | 8.76 | 3.65 | 0.96 | 0.11 | 0.12 | 0.52 |
| 5 | 15.57 | 11.97 | 4.89 | 10.96 | 5.86 | 6.78 | 7.79 | 16.71 | 10.88 | 4.26 | 4.40 | 0.23 | 0.47 | 1.13 |
| 6 | 25.58 | 7.52 | 4.52 | 18.10 | 5.27 | 10.05 | 12.43 | 27.99 | 17.43 | 4.80 | 12.25 | 1.38 | 1.09 | 3.86 |
| 7 | 23.41 | 7.17 | 3.08 | 9.58 | 7.99 | 9.03 | 24.41 | 61.61 | 29.84 | 6.51 | 17.81 | 3.31 | 1.48 | 5.75 |
| 8 | 14.29 | 5.42 | 2.25 | 8.80 | 6.16 | 8.03 | 14.60 | 43.02 | 33.89 | 7.34 | 20.05 | 4.99 | 1.40 | 5.53 |
| 9 | 12.62 | 6.76 | 0.75 | 6.81 | 4.15 | 8.23 | 6.88 | 23.65 | 19.01 | 8.64 | 19.45 | 5.05 | 2.17 | 3.67 |
| 10 | 10.27 | 4.90 | 0.78 | 7.21 | 2.68 | 3.69 | 2.38 | 13.98 | 6.45 | 4.62 | 9.85 | 4.61 | 3.63 | 2.73 |
| 11 | 6.37 | 4.28 | 0.71 | 4.70 | 1.74 | 3.94 | 2.20 | 5.09 | 1.48 | 1.83 | 5.84 | 2.70 | 5.05 | 1.84 |
| 12 | 3.08 | 4.49 | 0.74 | 1.91 | 0.64 | 2.81 | 2.09 | 2.94 | 1.27 | 1.53 | 2.05 | 1.32 | 5.16 | 1.89 |
| 13 | 3.96 | 3.45 | 0.37 | 0.91 | 0.10 | 1.32 | 1.21 | 1.35 | 1.46 | 0.77 | 1.24 | 0.53 | 5.82 | 1.57 |
| 14 | 2.50 | 0.65 | 0.16 | 0.33 | 0.24 | 0.46 | 0.84 | 0.51 | 1.77 | 0.60 | 0.68 | 0.39 | 5.12 | 0.92 |
| 15 | 2.16 | 1.42 | 0.13 | 0.29 | 0.10 | 0.16 | 0.66 | 0.02 | 0.45 | 0.23 | 0.51 | 0.19 | 6.38 | 0.99 |
| 16 | 1.14 | 0.25 | 0.17 | 0.35 | 0.06 | 0.44 | 0.42 | 0.23 | 0.70 | 0.12 | 0.59 | 0.05 | 5.76 | 0.57 |
| 17 | 0.75 | 0.43 | 0.04 | 0.05 | 0.02 | 0.10 | 0.07 | 0.01 | 0.23 | 0.06 | 0.14 | 0.02 | 3.66 | 0.16 |
| 18 | 0.61 | 0.11 | 0.05 | 0.09 | 0.01 | - | - | 0.03 | 0.47 | 0.11 | 0.09 | 0.02 | 4.19 | 0.07 |
| 19 | 0.25 | 0.14 | 0.02 | 0.01 | 0.01 | - | - | - | 0.49 | 0.02 | 0.06 | - | 0.26 | 0.01 |
| 20 | 0.08 | 0.03 | - | 0.03 | - | - | - | - | - | 0.02 | - | - | 0.13 | - |
| 21 | 0.18 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 22 | 0.14 | 0.02 | - | - | - | - | - | - | - | - | - | - | - | - |
| 23 | 0.05 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Unknown | - | - | 0.02 | - | 0.03 | 0.53 | - | 0.02 | - | - | - | - | -- | - |
| Mean | 134.40 | 73.03 | 22.44 | 77.91 | 36.01 | 58.36 | 79.68 | 207.86 | 136.73 | 46.49 | 96.20 | 24.90 | 51.89 | 31.33 |
| No. Sets | 39 | 47 | 40 | 33 | 56 | 38 | 39 | 22 | 19 | 29 | 36 | 24 | 24 | 28 |

Table 10. Mean number per tow from R.V. surveys in Subdivision 3Ps. The same strata were used in the calculations for each year. Values for the trips by the A. T. Cameron, 1973-82 were adjusted by the appropriate conversion factors so that these trips would be comparable to those of the A. Needler, 1983-84, and the W. Templeman, 1985-86.

| | YEAR-SURVEY | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | ATC207 1973 | ATC221 1974 | ATC234 1975 | ATC247 1976 | ATC261 1977 | ATC275 1978 | ATC287 1979 | ATC302 1980 | ATC316 1981 | ATC330 1982 | AN9 1983 | AN26 1984 | WT26 1985 | WT 45 1986 |
| 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2 | 0.02 | 0.33 | 0.01 | - | 0.01 | - | 0.08 | 0.45 | 0.09 | 0.05 | 0.01 | - | - | - |
| 3 | 1.88 | 2.24 | 0.52 | 0.28 | 0.09 | 0.67 | 0.28 | 2.12 | 0.99 | 0.64 | 0.22 | - | - | 0.12 |
| 4 | 3.80 | 4.44 | 1.35 | 3.60 | 0.38 | 0.73 | 1.49 | 2.78 | 4.38 | 1.83 | 0.96 | 0.11 | 0.12 | 0.52 |
| 5 | 8.71 | 6.06 | 2.63 | 5.54 | 3.28 | 3.39 | 3.90 | 8.35 | 5.57 | 2.40 | 4.40 | 0.23 | 0.47 | 1.13 |
| 6 | 16.46 | 4.72 | 3.70 | 13.11 | 3.55 | 5.27 | 7.40 | 17.32 | 11.50 | 3.19 | 12.25 | 1.38 | 1.09 | 3.86 |
| 7 | 22.12 | 6.90 | 3.70 | 10.51 | 7.59 | 7.67 | 20.37 | 52.05 | 31.42 | 5.11 | 17.81 | 3.31 | 1.48 | 5.75 |
| 8 | 17.03 | 6.71 | 2.92 | 11.15 | 7.63 | 9.85 | 17.37 | 47.85 | 42.71 | 8.35 | 20.05 | 4.99 | 1.40 | 5.53 |
| 9 | 15.80 | 8.79 | 0.98 | 8.70 | 5.39 | 10.70 | 8.73 | 30.14 | 24.72 | 11.07 | 19.45 | 5.05 | 2.17 | 3.67 |
| 10 | 12.52 | 6.38 | 1.01 | 9.38 | 3.48 | 4.81 | 3.09 | 17.58 | 8.39 | 6.00 | 9.85 | 4.61 | 3.63 | 2.73 |
| 11 | 8.28 | 5.57 | 0.92 | 6.11 | 2.25 | 5.12 | 2.85 | 6.61 | 1.92 | 2.39 | 5.84 | 2.70 | 5.05 | 1.84 |
| 12 | 4.00 | 5.83 | 0.96 | 2.48 | 0.83 | 3.66 | 2.71 | 3.82 | 1.65 | 1.99 | 2.05 | 1.32 | 5.16 | 1.89 |
| 13 | 5.14 | 4.48 | 0.48 | 1.18 | 0.14 | 1.72 | 1.57 | 1.76 | 1.90 | 1.00 | 1.24 | 0.53 | 5.82 | 1.57 |
| 14 | 3.26 | 0.84 | 0.20 | 0.42 | 0.31 | 0.60 | 1.09 | 0.66 | 2.30 | 0.77 | 0.68 | 0.39 | 5.12 | 0.92 |
| 15 | 2.81 | 1.85 | 0.17 | 0.38 | 0.13 | 0.20 | 0.85 | 0.02 | 0.59 | 0.29 | 0.51 | 0.19 | 6.38 | 0.99 |
| 16 | 1.49 | 0.32 | 0.22 | 0.46 | 0.07 | 0.57 | 0.54 | 0.29 | 0.91 | 0.15 | 0.59 | 0.05 | 5.76 | 0.57 |
| 17 | 0.98 | 0.55 | 0.06 | 0.08 | 0.02 | 0.14 | 0.09 | 0.02 | 0.30 | 0.08 | 0.14 | 0.02 | 3.66 | 0.16 |
| 18 | 0.79 | 0.14 | 0.07 | 0.12 | 0.02 | - | - | 0.03 | 0.61 | 0.15 | 0.09 | 0.02 | 4.19 | 0.07 |
| 19 | 0.32 | 0.18 | 0.03 | 0.03 | 0.01 | - | - | - | 0.64 | 0.03 | 0.06 | - | 0.26 | 0.01 |
| 20 | 0.10 | 0.04 | - | 0.04 | - | - | - | - | - | 0.02 | - | - | 0.13 | - |
| 21 | 0.24 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 22 | 0.18 | 0.03 | - | - | - | - | - | - | - | - | - | - | - | - |
| 23 | 0.06 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Unknown | - | - | 0.02 | - | 0.01 | 0.58 | - | 0.02 | - | - | - | - | - | - |
| Mean | 125.99(39) | 66.40(47) | 19.95(40) | 73.57(33) | 35.19(56) | 55.68(38) | 72.41(39) | 191.87(22) | 140.59(19) | 45.51(29) | 96.20(36) | 24.90(24) | 51.89(24) | 31.33(28) |

Table 11. Mean number and weight per 30 minute tow, and corresponding abundance and biomass estimates, of American plaice from research vessel survey data from selected strata in Subdivision 3Ps.

| Year | Mean number/tow | Number x $10^{-6}$ | No. sets | Missing strata | Mean weight kg/tow | Biomass kg x $10^{-6}$ |
|---|---|---|---|---|---|---|
| 1972 | 26.9 | 5.1 | 23 | 308,310,318 | 11.6 | 2.2 |
| 1973 | 137.4 | 28.6 | 39 | 310 | 46.9 | 9.8 |
| 1974 | 77.3 | 17.1 | 47 | - | 25.4 | 5.6 |
| 1975 | 22.7 | 4.7 | 40 | 316 | 7.1 | 1.5 |
| 1976 | 77.9 | 16.2 | 33 | 310 | 25.2 | 5.3 |
| 1977 | 36.0 | 8.0 | 56 | - | 18.0 | 4.0 |
| 1978 | 58.2 | 12.4 | 38 | 308 | 17.2 | 3.7 |
| 1979 | 79.9 | 17.7 | 39 | - | 25.1 | 5.6 |
| 1980 | 206.9 | 45.7 | 22 | - | 47.3 | 10.5 |
| 1981 | 136.8 | 29.0 | 19 | 318 | 47.8 | 10.1 |
| 1982 | 46.5 | 9.6 | 29 | 316 | 17.0 | 3.5 |
| 1983 | 96.2 | 21.3 | 36 | - | 45.8 | 10.1 |
| 1984 | 24.9 | 5.5 | 24 | - | 16.4 | 3.6 |
| 1985 | 51.9 | 11.0 | 24 | 318 | 101.8 | 21.6 |
| 1986 | 31.4 | 6.9 | 28 | - | 20.8 | 4.6 |
| 1987 | 67.2 | 14.9 | 31 | - | 57.6 | 12.7 |

Table 12. Partial recruitment vectors for A. plaice in Subdivision 3Ps

| Age | PR used in 1981 assessment | PR used in current assessment |
|---|---|---|
| 6 | .01 | .002 |
| 7 | .03 | .024 |
| 8 | .10 | .20 |
| 9 | .28 | .49 |
| 10 | .40 | .79 |
| 11 | .55 | 1.00 |
| 12 | .78 | 1.00 |
| 13-19 | 1.00 | 1.00 |

Table 13. Estimates of mortality for A. plaice in Subdivision 3Ps, from commercial and research vessel survey data.

| | Catch curves | | | | | |
|---|---|---|---|---|---|---|
| Age | Ln, 1986 survey nos/tow, sel. strata | | Ln, 1983-86 survey nos/tow, sel. strata | | Ln, 1986 commercial numbers at age | |
| 7 | 1.75 | | 3.34 | | 4.14 | |
| 8 | 1.71 | | 3.46 | | 5.53 | |
| 9 | 1.30 | | 3.41 | | 6.11 | |
| 10 | 1.00 | | 3.04 | | 6.60 | |
| 11 | 0.61 | | 2.74 | | 7.01 | |
| 12 | 0.64 | | 2.34 | | 6.72 | |
| 13 | 0.45 | | 2.21 | | 5.89 | |
| 14 | -0.08 | | 1.96 | | 5.75 | |
| 15 | -0.01 | | 2.09 | | 5.09 | |
| 16 | -0.56 | | 1.94 | | 4.20 | |
| 17 | -1.83 | | 1.38 | | 3.00 | |
| 18 | -2.66 | | 1.47 | | 1.95 | |
| 19 | -4.61 | | -1.11 | | - | |
| 20 | - | | -2.04 | | - | |
| r | 0.92 | Ages | 0.88 | Ages | 0.98 | Ages |
| intercept | 5.48 | 7-19 | 6.91 | 8-20 | 15.26 | 11-18 |
| Slope | -0.43 | | -0.37 | | -0.71 | |
| r | 0.94 | Ages | 0.97 | Ages | | |
| intercept | 4.59 | 7-18 | 5.09 | 8-18 | | |
| Slope | -0.35 | | -0.21 | (Fig. 5) | | |

Table 13 (Cont'd.)

Survival Estimates, catch numbers per 10 hours of effort

| Age | 1984 | 1985 | 1986 | 1985/84 | 1986/85 |
|---|---|---|---|---|---|
| 6 | 12 | 8 | 4 | $\frac{\Sigma 10\text{-}19(85)}{\Sigma 9\text{-}18(84)} = \frac{9476}{12,578}$, Z=0.28 | $\frac{\Sigma 10\text{-}19(86)}{\Sigma 9\text{-}18(85)} = \frac{4962}{12,123}$, Z=0.89 |
| 7 | 40 | 75 | 89 | | |
| 8 | 308 | 1010 | 357 | | |
| 9 | 1738 | 2658 | 637 | | |
| 10 | 3317 | 3243 | 1045 | $\frac{\Sigma 11\text{-}19(85)}{\Sigma 10\text{-}18(84)} = \frac{6233}{10,840}$, Z=0.55 | $\frac{\Sigma 11\text{-}19(86)}{\Sigma 10\text{-}18(85)} = \frac{3917}{9465}$, Z=0.88 |
| 11 | 3467 | 2692 | 1424 | | |
| 12 | 1891 | 1546 | 1173 | | |
| 13 | 1012 | 775 | 511 | | |
| 14 | 663 | 515 | 445 | $\frac{\Sigma 12\text{-}19(85)}{\Sigma 11\text{-}18(84)} = \frac{3541}{7523}$, Z= 0.75 | $\frac{\Sigma 12\text{-}19(86)}{\Sigma 11\text{-}18(85)} = \frac{2493}{6222}$, Z=0.92 |
| 15 | 317 | 347 | 230 | | |
| 16 | 121 | 182 | 95 | | |
| 17 | 35 | 120 | 28 | | |
| 18 | 17 | 45 | 10 | | |
| 19 | 3 | 11 | 1 | | |

Survival Estimates, R.V. Survey nos/tow (Table 9)

| | | | | | |
|---|---|---|---|---|---|
| 6 | 1.38 | 1.09 | 3.86 | | |
| 7 | 3.31 | 1.48 | 5.75 | $\frac{\Sigma 10\text{-}19(85)}{\Sigma 9\text{-}18(84)} = \frac{46.03}{14.88}$, Z<0. | $\frac{\Sigma 10\text{-}19(86)}{\Sigma 9\text{-}18(85)} = \frac{10.75}{46.94}$, Z=1.47 |
| 8 | 4.99 | 1.40 | 5.53 | | |
| 9 | 5.05 | 2.17 | 3.67 | | |
| 10 | 4.61 | 3.63 | 2.73 | | |
| 11 | 2.70 | 5.05 | 1.84 | | |
| 12 | 1.32 | 5.16 | 1.89 | | |
| 13 | 0.53 | 5.82 | 1.57 | | |
| 14 | 0.39 | 5.12 | 0.92 | | |
| 15 | 0.19 | 6.38 | 0.99 | | |
| 16 | 0.05 | 5.76 | 0.57 | | |
| 17 | 0.02 | 3.66 | 0.16 | | |
| 18 | 0.02 | 4.19 | 0.07 | | |
| 19 | - | 0.26 | 0.01 | | |

Table 14. Results of SPA calibration, 3Ps A. plaice.

| Regression | Parameter | FT .15 | .18 | .184 | .20 | .30 |
|---|---|---|---|---|---|---|
| 8+biomass from SPA vs CPUE, 1974-86, 1984-85 omitted | r | .769 | .724 | .716 | .677 | .228 |
| | intercept | -7790 | -749 | +19 | +2784 | +7132 |
| | '86 residual | +7110 | +4716 | +4455 | +3513 | -91 |

Table 15. Results of SPA on 3Ps A. plaice at $F_t$ = 0.18.

POPULATION NUMBERS

| AGE | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 10637 | 14625 | 12129 | 14968 | 17665 | 20467 | 17237 | 20841 | 23101 | 15715 | 11324 | 11736 | 13197 | [illegible] |
| 4 | 10287 | 12904 | 11577 | 9587 | 11498 | 14447 | 15714 | 13832 | 21100 | 18736 | 13068 | 7587 | 9129 | [illegible] |
| 5 | 8723 | 10377 | 9656 | 8903 | 7452 | 9769 | 11651 | 12497 | 12607 | 17066 | 15772 | 10474 | 6676 | [illegible] |
| 6 | 7877 | 8380 | 7972 | 7281 | 6173 | 5786 | 7113 | 7620 | 10596 | 9861 | 13894 | 12107 | 8072 | [illegible] |
| 7 | 7148 | 6337 | 4178 | 5715 | 4579 | 4347 | 3855 | 5022 | 5713 | 7954 | 7037 | 10974 | 9571 | [illegible] |
| 8 | 7004 | 5404 | 3228 | 3072 | 3533 | 2727 | 2544 | 2422 | 3407 | 3937 | 5739 | 5871 | 7557 | [illegible] |
| 9 | 6196 | 5083 | 2438 | 2230 | 1630 | 2031 | 1712 | 1614 | 1540 | 2475 | 2162 | 3416 | 3876 | [illegible] |
| 10 | 4277 | 4249 | 2378 | 1307 | 1204 | 1024 | 1066 | 1088 | 829 | 947 | 1343 | 1215 | 2088 | [illegible] |
| 11 | 1576 | 1110 | 949 | 918 | 354 | 765 | 545 | 509 | 569 | 418 | 528 | 1071 | 1088 | [illegible] |
| 12 | 1225 | 1145 | 727 | 544 | 488 | 314 | 370 | 311 | 444 | 133 | 233 | 413 | 1090 | [illegible] |
| 13 | 977 | 940 | 327 | 344 | 288 | 181 | 145 | 203 | 182 | 82 | 110 | 277 | 238 | [illegible] |
| 14 | 410 | 488 | 350 | 377 | 237 | 121 | 91 | 80 | 128 | 28 | 27 | 61 | 124 | [illegible] |
| 15 | 443 | 224 | 204 | 244 | 173 | 32 | 31 | 29 | 47 | 21 | 8 | 18 | 56 | [illegible] |
| 16 | 157 | 303 | 74 | 76 | 128 | 18 | 8 | 45 | 43 | 10 | 6 | 10 | 21 | [illegible] |
| 17 | 17 | 120 | 124 | 5 | 41 | 13 | 3 | 4 | 24 | 2 | 3 | 4 | 11 | [illegible] |
| 6+ | 74714 | 80406 | 54324 | 54107 | 55407 | 61831 | 65114 | 72357 | 81417 | 78299 | 72734 | 67734 | 71234 | [illegible] |
| 7+ | 57275 | 65781 | 42204 | 46140 | 53787 | 61814 | 64777 | 66537 | 81417 | 78299 | 72734 | 67734 | 71234 | [illegible] |
| 8+ | 49128 | 59377 | 38026 | 38471 | 48308 | 56467 | 57063 | 59916 | 67030 | 70338 | 64693 | 56760 | 62155 | [illegible] |
| 9+ | 37855 | 44000 | 26398 | 30471 | 41308 | 46681 | 45348 | 47494 | 54430 | 62477 | 58921 | 46889 | 54079 | [illegible] |
| 10+ | 28198 | 28750 | 17168 | 14407 | 12755 | 11897 | 10400 | 11397 | 13897 | 15756 | 17127 | 19032 | 23500 | [illegible] |
| 11+ | 19920 | 19791 | 8972 | 8872 | 8150 | 7653 | 6334 | 6357 | 7068 | 7418 | 11520 | 13818 | 16074 | [illegible] |
| 12+ | 11215 | 7478 | 6744 | 5620 | 4617 | 4335 | 3871 | 3775 | 3603 | 4000 | 5972 | 9203 | 7065 | [illegible] |
| 13+ | 3027 | 4710 | 3626 | 3357 | 2787 | 2305 | 2177 | 2360 | 2212 | 1867 | 2582 | 4128 | 3407 | [illegible] |

POPULATION BIOMASS

| AGE | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 4125 | 3814 | 3152 | 3897 | 4225 | 5762 | 5353 | 3771 | 7324 | 4979 | 2335 | 2324 | [illegible] | [illegible] |
| 4 | 3349 | 4018 | 4018 | 3271 | 3857 | 4158 | 5735 | 4481 | 8600 | 7654 | 4981 | 2647 | 1775 | [illegible] |
| 5 | 3812 | 3918 | 3848 | 3123 | 2587 | 3159 | 3132 | 4693 | 7631 | 4987 | 2847 | 1917 | 1665 | [illegible] |
| 6 | 2745 | 3872 | 2922 | 2637 | 2101 | 1971 | 4872 | 4867 | 5633 | 9443 | 5343 | 3417 | 2401 | [illegible] |
| 7 | 3813 | 2738 | 3077 | 2475 | 2212 | 2338 | 2343 | 3838 | 3267 | 3791 | 6944 | 4376 | 3213 | [illegible] |
| 8 | 3442 | 2798 | 2077 | 2475 | 2287 | 2308 | 2497 | 2838 | 3267 | 3791 | 6944 | 4376 | 3213 | [illegible] |
| 9 | 3788 | 2771 | 2844 | 2783 | 2387 | 1787 | 2359 | 2784 | 2788 | 3400 | 4468 | 4081 | 2139 | [illegible] |
| 10 | 3141 | 2417 | 2402 | 1886 | 2108 | 1844 | 2141 | 1487 | 2397 | 1820 | 3037 | 2706 | 3543 | [illegible] |
| 11 | 2474 | 2317 | 2402 | 1886 | 2108 | 1844 | 2141 | 1487 | 2397 | 1820 | 3037 | 2706 | 3543 | [illegible] |
| 12 | 3773 | 2218 | 2133 | 1738 | 1366 | 1424 | 1838 | 1148 | 1821 | 1966 | 2826 | 2850 | 3600 | [illegible] |
| 13 | 2917 | 2033 | 1530 | 1208 | 1327 | 870 | 1423 | 1078 | 877 | 792 | 1273 | 2414 | 2724 | [illegible] |
| 14 | 1860 | 1448 | 1218 | 955 | 746 | 587 | 875 | 1077 | 474 | 407 | 788 | 1164 | 2175 | [illegible] |
| 15 | 1470 | 1007 | 921 | 710 | 666 | 387 | 677 | 966 | 374 | 173 | 374 | 741 | 1312 | [illegible] |
| 16 | 815 | 931 | 571 | 681 | 477 | 366 | 327 | 424 | 136 | 84 | 138 | 388 | 1150 | [illegible] |
| 17 | 1142 | 932 | 380 | 400 | 187 | 47 | 178 | 181 | 130 | 32 | 66 | 93 | 242 | [illegible] |
| 18 | 407 | 649 | 73 | 175 | 137 | 28 | 27 | 107 | 47 | 30 | 18 | 40 | 20 | [illegible] |
| 19 | 26 | 277 | 265 | 16 | 82 | 30 | 8 | 10 | 38 | 6 | 23 | 10 | 67 | [illegible] |
| 6+ | 33786 | 28744 | 28987 | 23853 | 21127 | 23916 | 31766 | 28377 | 35879 | 31203 | 33778 | 28747 | 34003 | [illegible] |
| 7+ | 29064 | 24933 | 24737 | 20045 | 18765 | 17825 | 26426 | 21896 | 28386 | 27333 | 31040 | 25583 | 31237 | [illegible] |
| 8+ | 25617 | 22215 | 20860 | 17569 | 17378 | 15861 | 18273 | 18024 | 17981 | 23543 | 26197 | 22882 | 28000 | [illegible] |
| 9+ | 22342 | 19428 | 18783 | 15094 | 15291 | 13974 | 16274 | 16537 | 14694 | 19543 | 20253 | 18476 | 24787 | [illegible] |
| 10+ | 18554 | 16657 | 15881 | 13211 | 13104 | 12187 | 14133 | 14050 | 12297 | 15743 | 15216 | 14570 | 21247 | [illegible] |
| 11+ | 15413 | 14240 | 13479 | 11325 | 10996 | 10343 | 12000 | 12563 | 9900 | 13923 | 12179 | 11864 | 17707 | [illegible] |
| 12+ | 12939 | 12023 | 11527 | 9437 | 8888 | 8519 | 10129 | 11415 | 8029 | 12103 | 9340 | 9294 | 14164 | [illegible] |
| 13+ | 9167 | 9877 | 9966 | 8000 | 7601 | 7659 | 8629 | 10337 | 7152 | 10136 | 7067 | 6880 | 11457 | [illegible] |

FISHING MORTALITY

| AGE | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 0.000 | 0.025 | 0.036 | 0.010 | 0.001 | 0.003 | 0.007 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 7 | 0.001 | 0.081 | 0.053 | 0.053 | 0.013 | 0.015 | 0.009 | 0.009 | 0.015 | 0.002 | 0.007 | 0.002 | 0.003 | 0.014 |
| 8 | 0.116 | 0.077 | 0.086 | 0.171 | 0.050 | 0.060 | 0.051 | 0.041 | 0.051 | 0.012 | 0.025 | 0.021 | 0.007 | 0.036 |
| 9 | 0.377 | 0.221 | 0.077 | 0.282 | 0.158 | 0.223 | 0.152 | 0.225 | 0.087 | 0.043 | 0.037 | 0.058 | 0.132 | 0.000 |
| 10 | 0.780 | 0.565 | 0.124 | 0.328 | 0.414 | 0.222 | 0.414 | 0.142 | 0.122 | 0.178 | 0.142 | 0.148 | 0.192 | 0.000 |
| 11 | 0.707 | 0.303 | 0.107 | 0.281 | 0.247 | 0.277 | 0.287 | 0.173 | 0.088 | 0.115 | 0.101 | 0.124 | 0.115 | 0.174 |
| 12 | 0.881 | 0.215 | 0.156 | 0.434 | 0.354 | 0.338 | 0.273 | 0.320 | 0.128 | 0.277 | 0.121 | 0.238 | 0.173 | 0.130 |
| 13 | 0.798 | 0.285 | 0.272 | 0.430 | 0.265 | 0.273 | 0.255 | 0.437 | 0.220 | 0.203 | 0.123 | 0.187 | 0.177 | 0.130 |
| 14 | 0.731 | 0.414 | 0.322 | 0.473 | 0.307 | 0.430 | 0.284 | 0.463 | 0.185 | 0.250 | 0.120 | 0.188 | 0.118 | 0.130 |
| 15 | 0.838 | 0.587 | 0.336 | 0.473 | 0.397 | 0.430 | 0.284 | 0.463 | 0.185 | 0.250 | 0.120 | 0.188 | 0.118 | 0.130 |
| 16 | 0.661 | 0.545 | 0.357 | 0.337 | 0.535 | 0.420 | 0.389 | 0.135 | 1.240 | 0.356 | 0.178 | 0.264 | 0.150 | 0.130 |
| 17 | 0.450 | 0.384 | 0.137 | 0.377 | 0.748 | 0.568 | 0.403 | 0.337 | 1.662 | 0.444 | 0.074 | 0.347 | 0.233 | 0.130 |
| 18 | 0.409 | 0.630 | 0.325 | 0.466 | 2.036 | 0.611 | 0.376 | 0.300 | 1.772 | 0.530 | 0.211 | 0.304 | 0.377 | 0.130 |
| 19 | 0.180 | 1.053 | 0.558 | 0.300 | 2.071 | 1.127 | 0.372 | 0.361 | 2.115 | 1.553 | 0.130 | 0.337 | 0.341 | 0.130 |
| 20 | 0.134 | 0.674 | 2.130 | 0.641 | 2.194 | 1.376 | 0.532 | 0.417 | 2.737 | 0.666 | 0.213 | 0.415 | 0.175 | 0.130 |
| 19 | 0.258 | 0.731 | 0.473 | 0.434 | 2.120 | 0.714 | 0.374 | 0.334 | 2.108 | 0.634 | 0.205 | 0.337 | 0.234 | 0.130 |

Table 16. Parameters used in catch projections for A. plaice in Subdiv. 3Ps.

| Age | 1987 Beginning Year Population ('000) | Av. wts. (kg) 1984-86 | Partial Recruitment |
|---|---|---|---|
| 6 | 17,010 | .258 | .002 |
| 7 | 13,924 | .312 | .018 |
| 8 | 10,530 | .388 | .14 |
| 9 | 6,206 | .487 | .36 |
| 10 | 4,392 | .620 | .65 |
| 11 | 4,347 | .791 | 1.00 |
| 12 | 4,585 | 1.073 | 1.00 |
| 13 | 3,777 | 1.355 | 1.00 |
| 14 | 1,644 | 1.697 | 1.00 |
| 15 | 1,434 | 2.148 | 1.00 |
| 16 | 740 | 2.669 | 1.00 |
| 17 | 306 | 3.135 | 1.00 |
| 18 | 91 | 3.478 | 1.00 |
| 19 | 32 | 4.056 | 1.00 |

Table 17. Catch projections, 3Ps A. plaice.

POPULATION NUMBERS

| AGE | 1986 | 1987 | 1988 |
|---|---|---|---|
| 6 | 17019 | 17019 | 17019 |
| 7 | 14034 | 13724 | 13720 |
| 8 | 7808 | 10850 | 11358 |
| 9 | 5868 | 6005 | 8348 |
| 10 | 6129 | 4332 | 4973 |
| 11 | 3700 | 4347 | 3071 |
| 12 | 5023 | 4085 | 2820 |
| 13 | 2404 | 3777 | 2774 |
| 14 | 2087 | 1844 | 2900 |
| 15 | 1062 | 1434 | 1066 |
| 16 | 447 | 740 | 930 |
| 17 | 134 | 306 | 460 |
| 18 | 47 | 81 | 128 |
| 19 | 7 | 32 | 37 |
| 6+ | 68223 | 67018 | 67367 |
| 7+ | 51213 | 52008 | 52357 |
| 8+ | 38692 | 38084 | 38437 |
| 9+ | 30424 | 27564 | 27087 |

CATCH NUMBERS

| AGE | 1986 | 1987 | 1988 |
|---|---|---|---|
| 6 | 3 | 7 | 3 |
| 7 | 65 | 88 | 87 |
| 8 | 268 | 398 | 504 |
| 9 | 447 | 453 | 652 |
| 10 | 737 | 560 | 535 |
| 11 | 1004 | 821 | 585 |
| 12 | 827 | 866 | 568 |
| 13 | 580 | 714 | 577 |
| 14 | 514 | 541 | 473 |
| 15 | 152 | 271 | 210 |
| 16 | 97 | 140 | 187 |
| 17 | 20 | 58 | 97 |
| 18 | 7 | 17 | 40 |
| 19 | 1 | 6 | 12 |
| 6+ | 4266 | 4583 | 4540 |
| 7+ | 4263 | 4576 | 4537 |
| 8+ | 4200 | 4488 | 4450 |
| 9+ | 3948 | 4217 | 4121 |

FISHING MORTALITY

| AGE | 1986 | 1987 | 1988 |
|---|---|---|---|
| 6 | 0.000 | 0.000 | 0.000 |
| 7 | 0.005 | 0.006 | 0.006 |
| 8 | 0.038 | 0.037 | 0.045 |
| 9 | 0.080 | 0.084 | 0.079 |
| 10 | 0.140 | 0.151 | 0.110 |
| 11 | 0.176 | 0.189 | 0.188 |
| 12 | 0.191 | 0.233 | 0.209 |
| 13 | 0.199 | 0.222 | 0.209 |
| 14 | 0.199 | 0.222 | 0.209 |
| 15 | 0.199 | 0.222 | 0.209 |
| 16 | 0.199 | 0.222 | 0.209 |
| 17 | 0.199 | 0.222 | 0.209 |
| 18 | 0.199 | 0.222 | 0.209 |
| 19 | 0.199 | 0.222 | 0.209 |

POPULATION BIOMASS (AVERAGE)

| AGE | 1986 | 1987 | 1988 |
|---|---|---|---|
| 6 | 3770.06 | 3771.54 | 3771.37 |
| 7 | 2651.02 | 3733.64 | 3731.38 |
| 8 | 2713.67 | 3642.17 | 3722.[illegible] |
| 9 | 2477.17 | 2631.47 | 3527.74 |
| 10 | 3015.98 | 2087.54 | 2431.47 |
| 11 | 2114.42 | 2441.54 | 1767.77 |
| 12 | 4413.88 | 2791.74 | 2177.61 |
| 13 | 1931.37 | 3374.60 | 2437.01 |
| 14 | 2709.33 | 4152.82 | 3244.50 |
| 15 | 2860.32 | 2024.57 | 3047.88 |
| 16 | 1933.20 | 2500.17 | 1844.67 |
| 17 | 773.34 | 1602.56 | 1275.37 |
| 18 | 340.37 | 778.67 | 1211.88 |
| 19 | 132.27 | 257.87 | 555.74 |
| 20 | 22.54 | 100.28 | 173.03 |
| 6+ | 34478.62 | 34324.87 | 34588.65 |
| 7+ | 30708.56 | 30553.35 | 30817.18 |
| 8+ | 26055.56 | 27017.71 | 26885.20 |
| 9+ | 24141.88 | 23377.52 | 22788.13 |

CATCH BIOMASS

| AGE | 1986 | 1987 | 1988 |
|---|---|---|---|
| 6 | 1 | 2 | 1 |
| 7 | 22 | 29 | 29 |
| 8 | 89 | 133 | 167 |
| 9 | 178 | 181 | 261 |
| 10 | 407 | 309 | 295 |
| 11 | 774 | 630 | 450 |
| 12 | 828 | 866 | 568 |
| 13 | 880 | 730 | 607 |
| 14 | 1000 | 767 | 511 |
| 15 | 1739 | 1547 | 997 |
| 16 | 1348 | 1960 | 1411 |
| 17 | 179 | 573 | 900 |
| 18 | 63 | 151 | 303 |
| 19 | 24 | 80 | 137 |
| 20 | 4 | 20 | 40 |
| 6+ | 4115 | 5000 | 5071 |
| 7+ | 4114 | 4999 | 5069 |
| 8+ | 4074 | 4982 | 5021 |
| 9+ | 3996 | 4863 | 4714 |

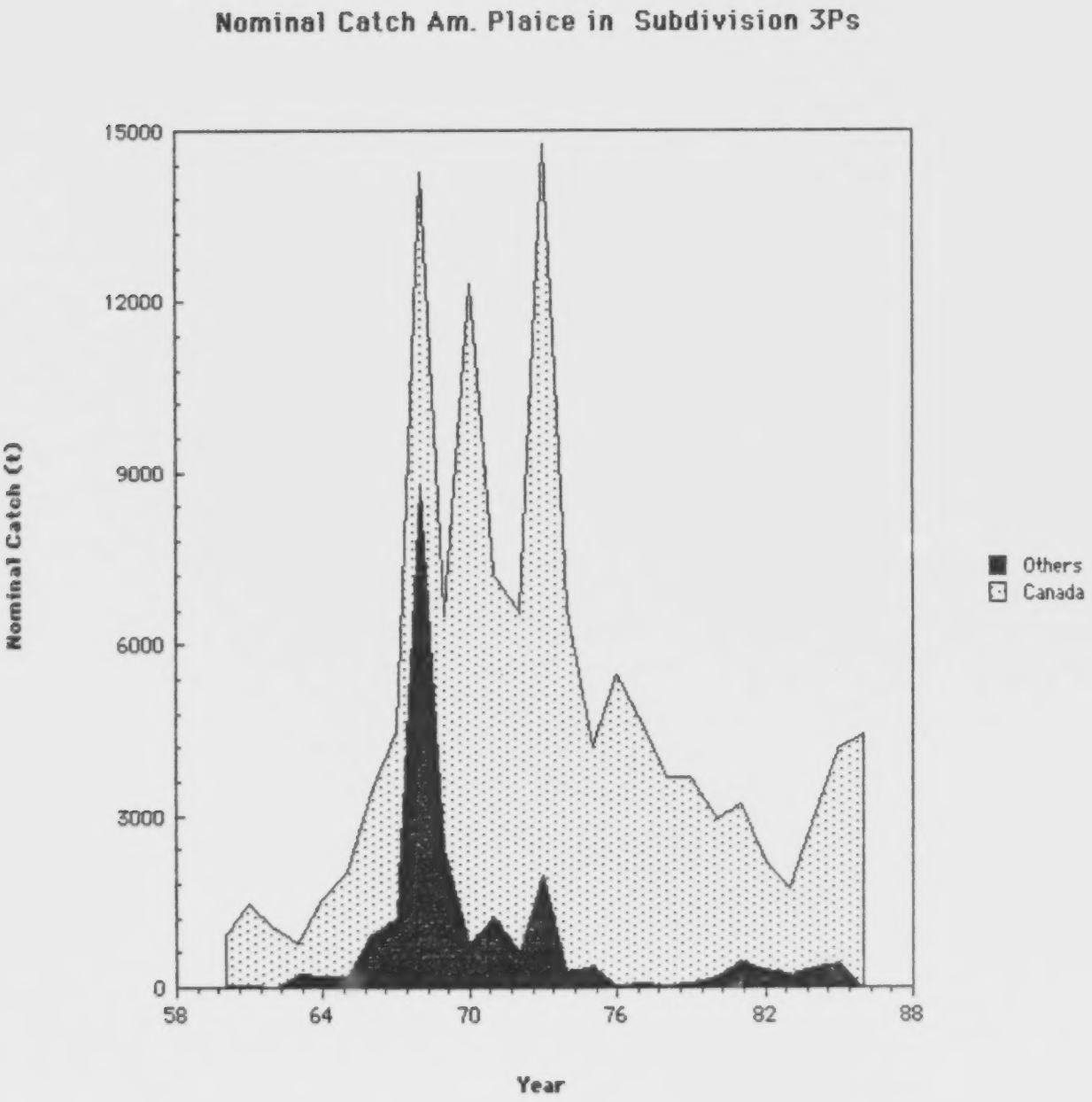


Fig.1. Nominal catch of Amercian plaice in subdivision 3Ps from 1960-1986.

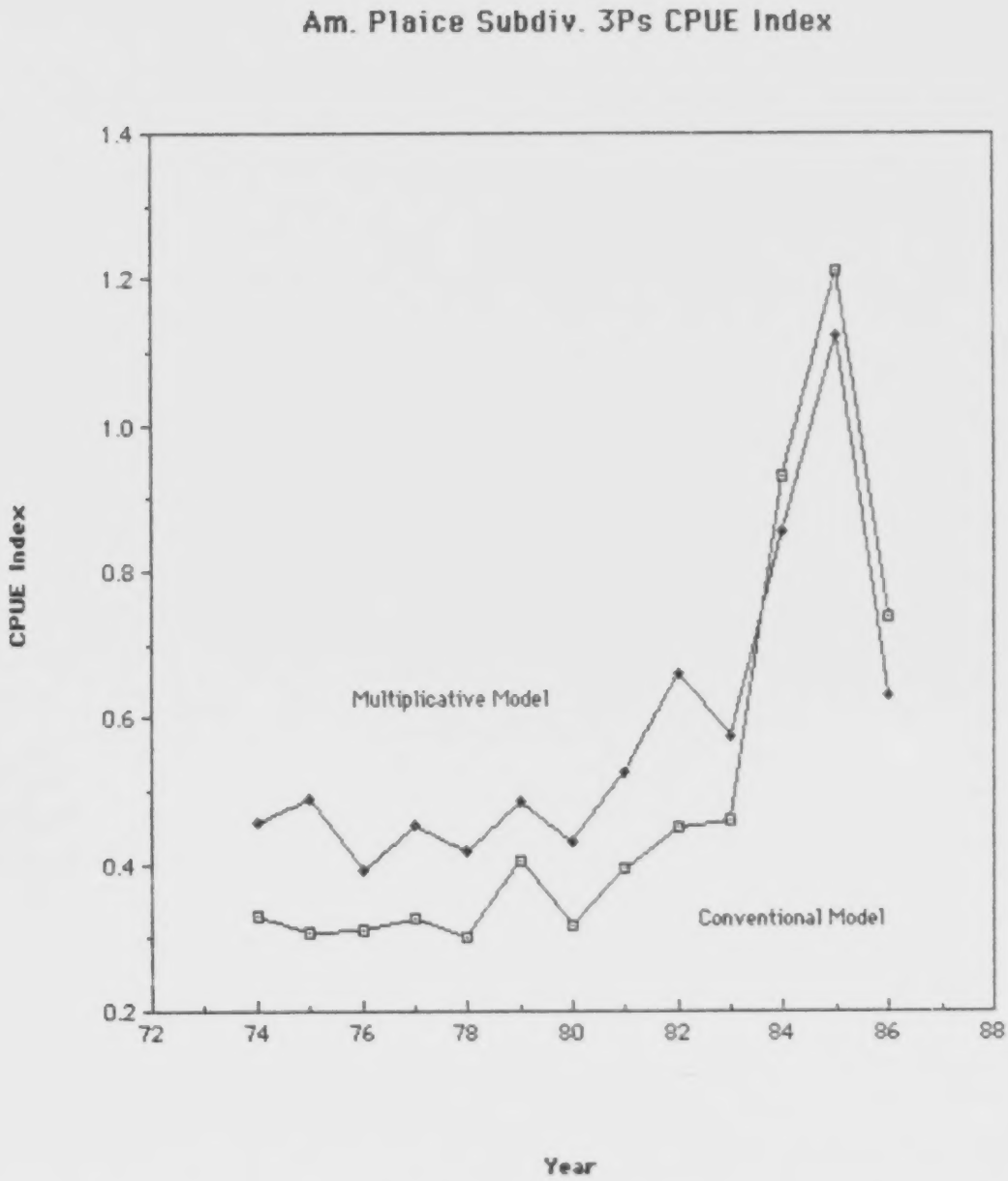


Fig.2. CPUE index of American plaice in NAFO Subdivision 3Ps during 1974-1986 using the conventional model and the multiplicative model.

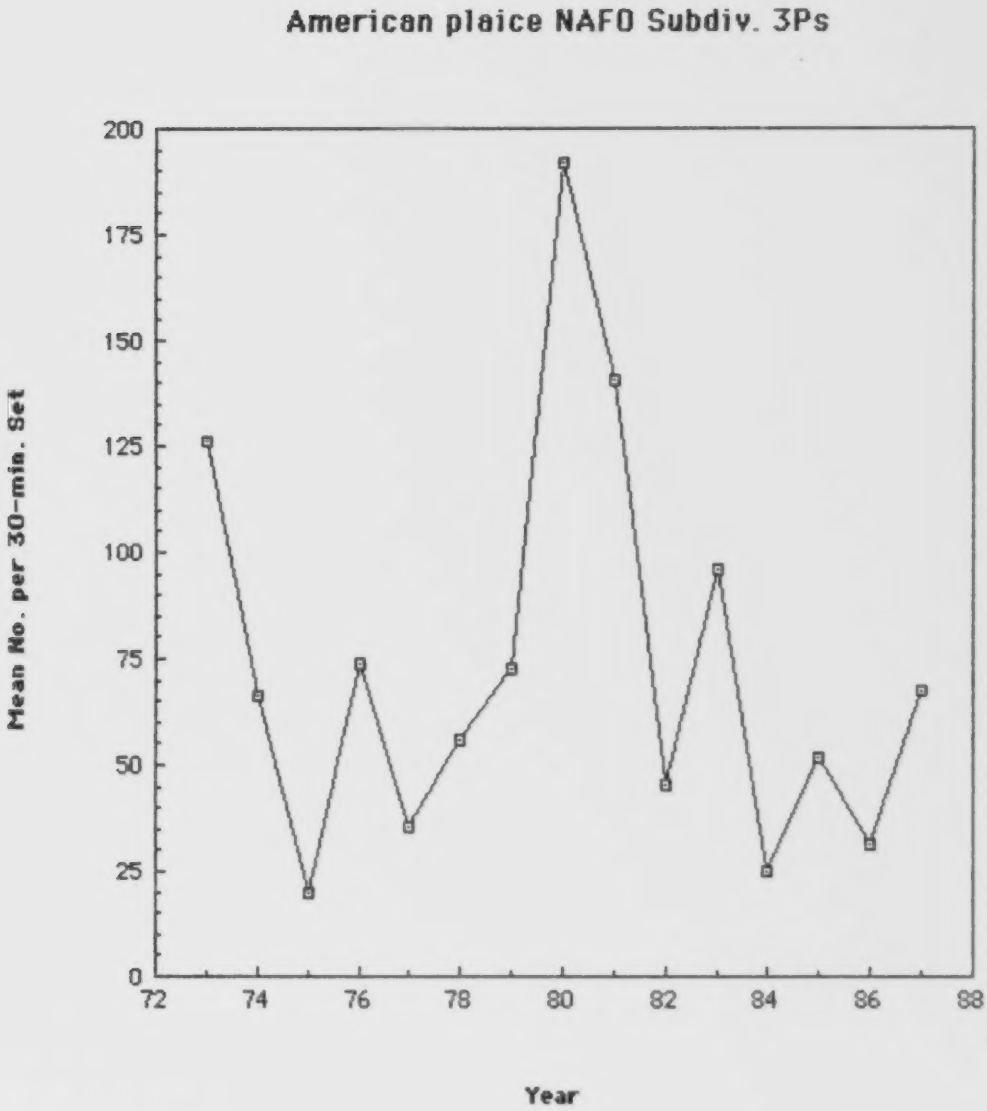


Fig.3. Mean no. per set of American plaice from research vessel surveys in NAFO subdiv. 3Ps during 1973-1987.

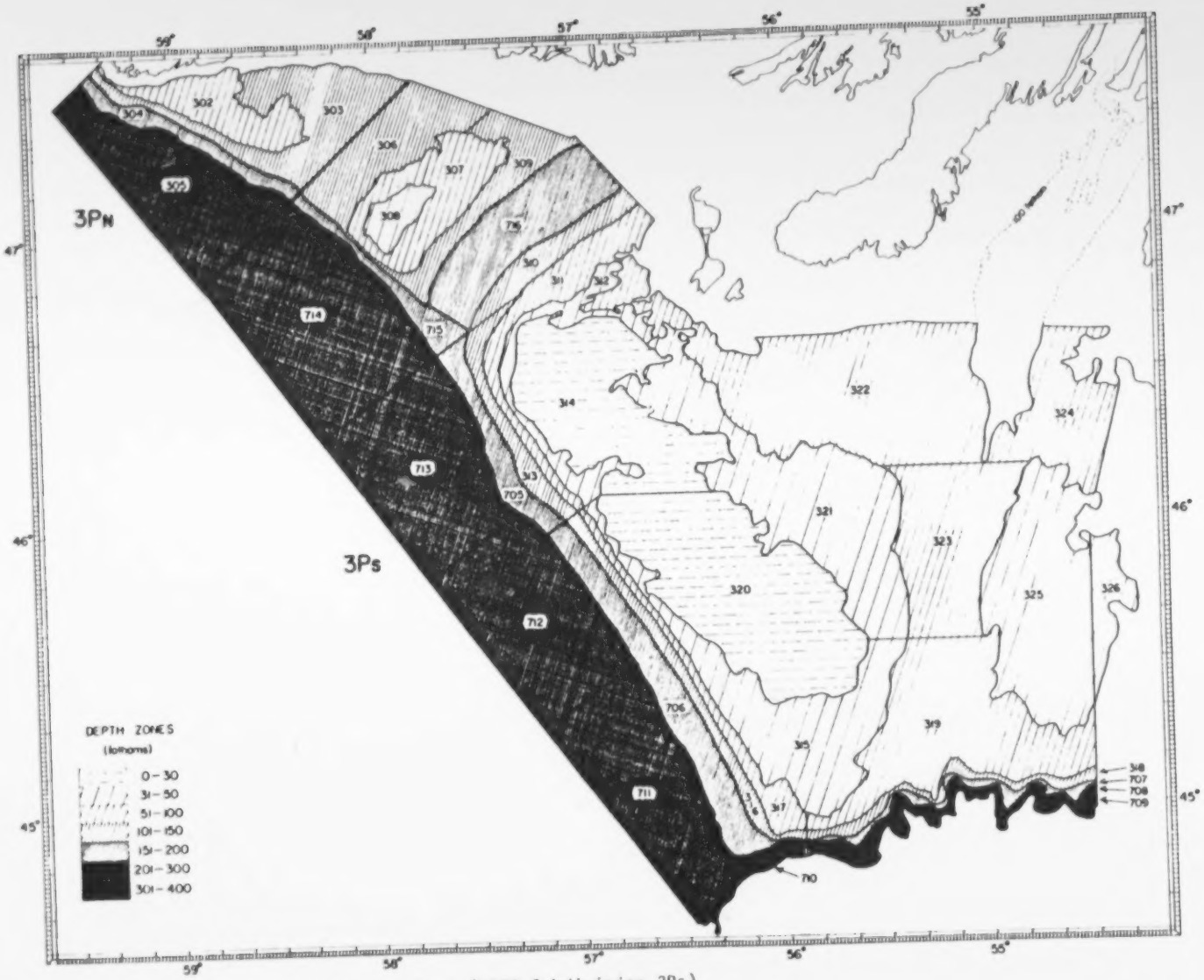


Fig. 4. Strata map of St. Pierre Bank (NAFO Subdivision 3Ps)

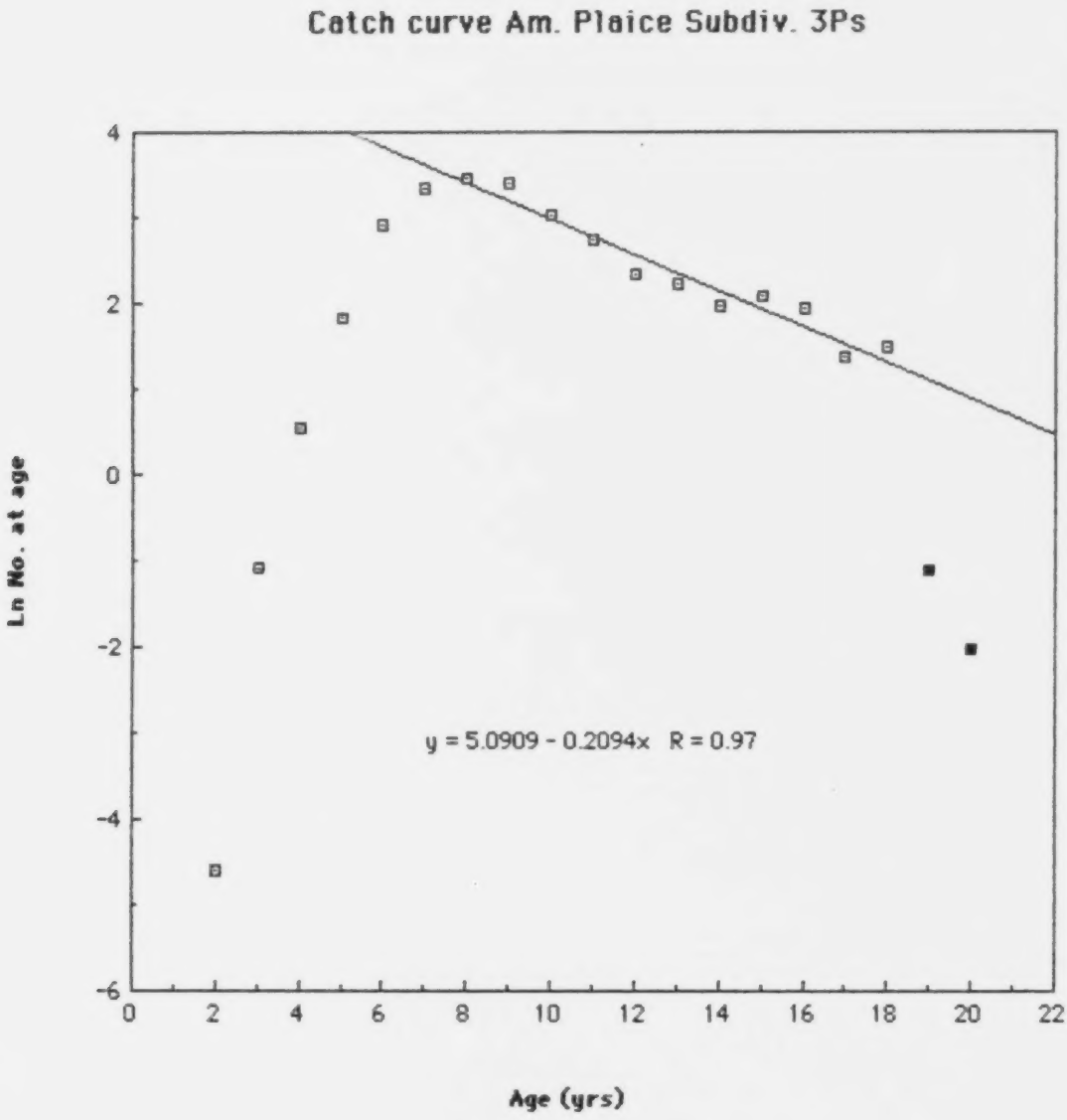


Fig.5. Catch curve of American plaice from research vessel surveys in NAFO Subdivision 3Ps, 1983-86.

Fig. 6. Plot of 8+ Biomass from SPA at $F_t$ = 0.18 vs CPUE, 3Ps A. plaice.